FACTORY

MANAGEMENT AND MAINTENANCE

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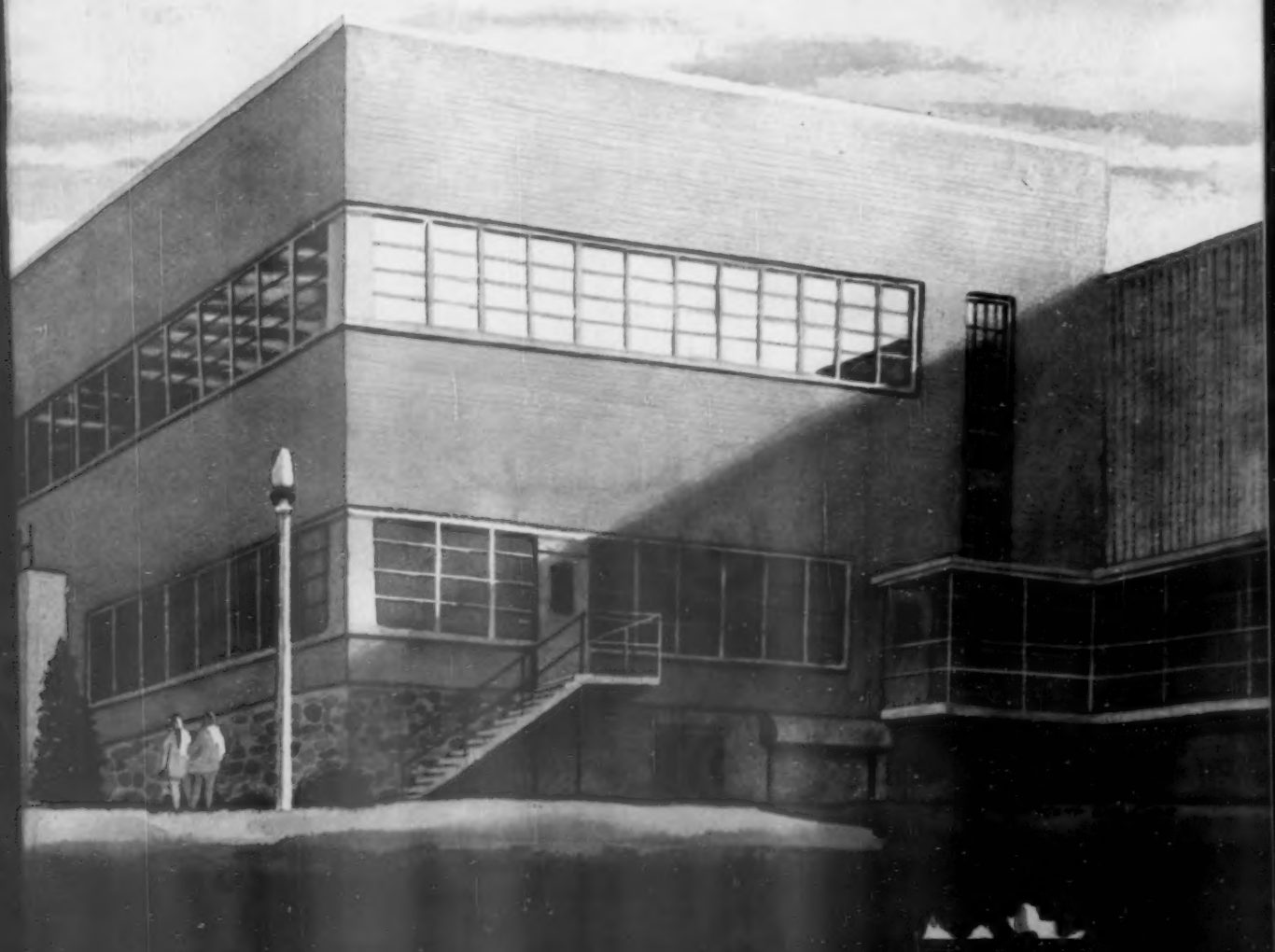

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THE MAGAZINE OF PLANT OPERATING MANAGEMENT

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Problem: At this power plant they have to get rid of huge loads of a waste material, called fly ash, every day. It's collected from furnaces, washed, then piped down the side of that building and away to a disposal pit so as not to polute the air or a near-by river. Fine, except that this mixture of gritty fly ash, corrosive acid water, sharp slivers of metal was eating holes through the metal pipe in only six months. Each pipe replacement cost $700 plus about 100 hours of workers' time.

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THE MAGAZINE OF PLANT OPERATING MANAGEMENT

Edited exclusively for the men with management responsibilty for production and maintenance in the manufacturing industries

PROBLEM-SOLVING GUIDE

THIS SIMPLE FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve current operating problems. Here's how it works:

1. All major articles and many short items are classified according to a functional code system (below). Codes cover basic operating responsibilities.

2. Where applicable, articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards and file by code number. To cross-index, copy the information on a second card, and file by secondary code.

Note: For suggestions on using this new tool (plus an outline for a more complete decimal filing system), see FACTORY, February 1957, page 104.

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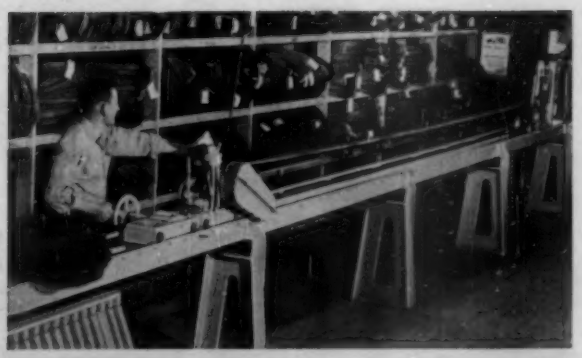

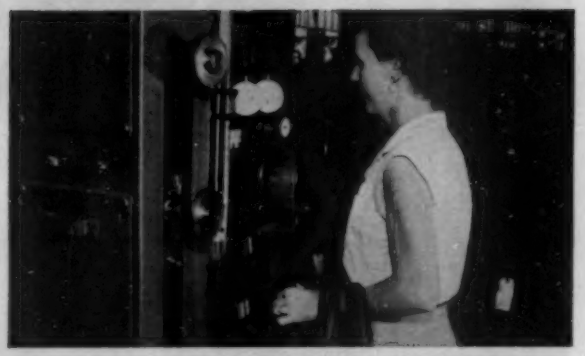

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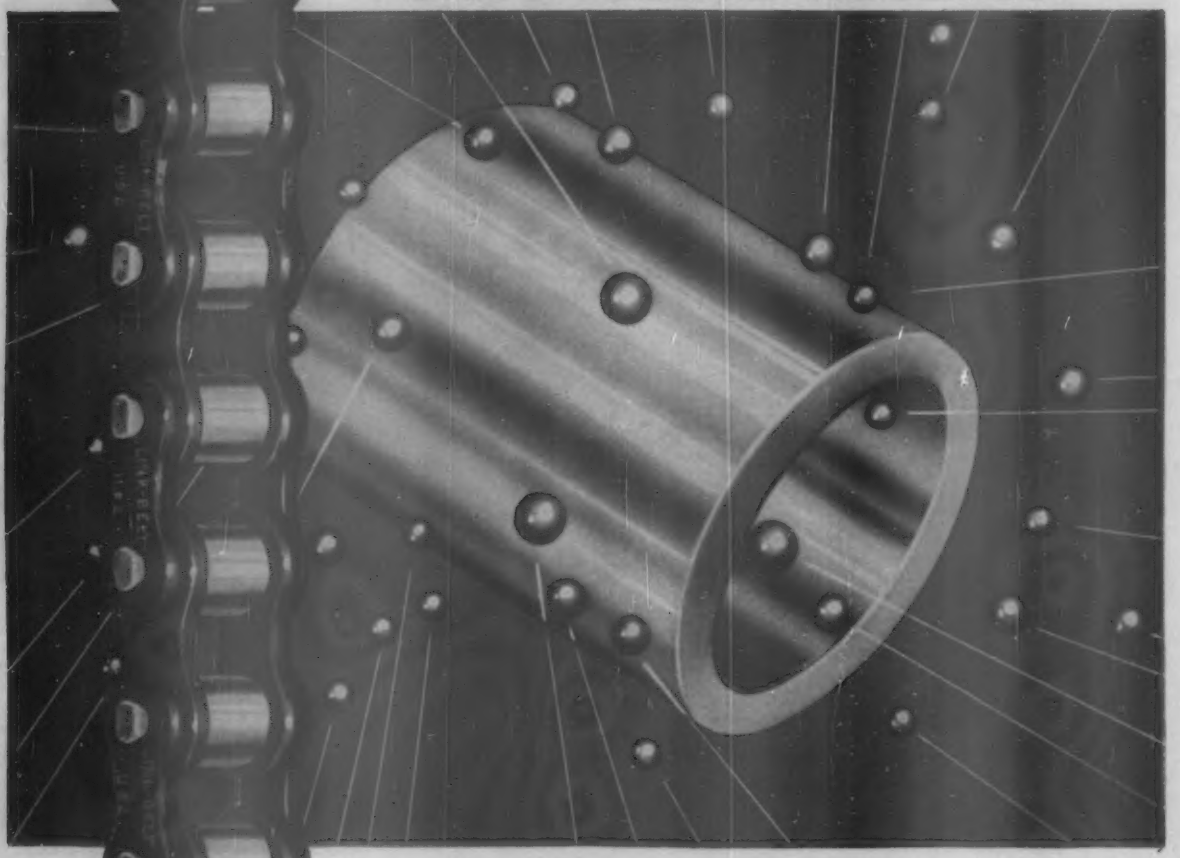

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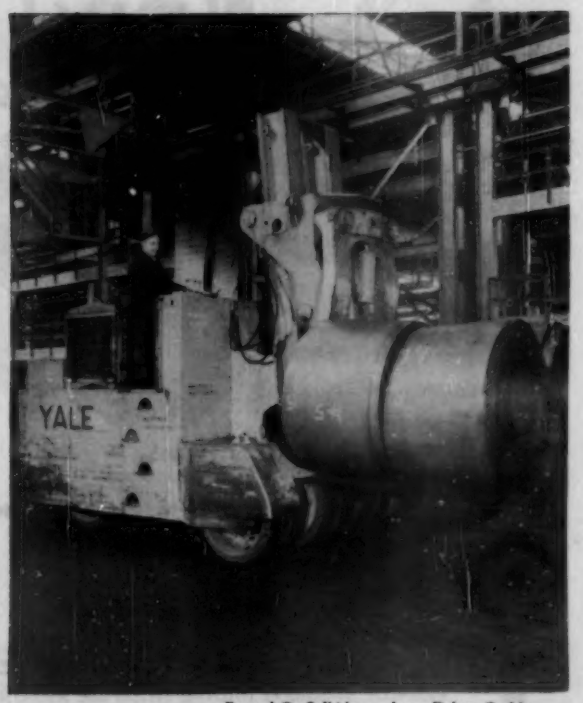

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FACTORY LETTERS

MORE ON CREDIT UNIONS

Sir:

We were surprised and disappointed to find [you] publishing an article extolling the virtues of credit unions (April 1958, p. 134). . .

Doubtless you and your company are aware of the principles and operations of credit unions, and the fact that credit unions are directly opposed to the free enterprise system. We feel certain that you are also aware of the fact that credit unions pay no Federal income taxes, and by their very existence increase the tax burden of other companies. . .

The socialistic ideals adhered to by credit unions should, we believe, be attacked at every opportunity by tax-paying businessmen throughout the nation and not condoned through either timidity or disinterest. . .

G. O. Keasey
Vice President
Associates Investment Co.
South Bend, Ind.

Sir:

At this point you have undoubtedly had some rather unfavorable reactions from readers concerning the article "Credit Unions Are Booming." And understandably so, considering the fact that by the release of this story you are, in a sense, supporting those who are attempting to promote the growth of these cooperatives. . .

Turn the page

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FACTORY / LETTERS

Begins on page 8

We do not say that credit unions have no right to exist, but in the interest of fair competition they should be required to bear their full share of the tax burdens of government.

Henry Barnhart
Vice President-General Manager
Construction Equipment Div.
Baldwin-Lima-Hamilton Corp.
Lima, Ohio.

Sir:

I have noted with interest the letter to you from Mr. Jack E. Reich of the Indiana State Chamber of Commerce (published in September "Letters to the Editor," p. 10).

I agree with everything Mr. Reich said.

The blindness of the average American business man and the average writer on private business, in the face of this serious threat to free enterprise, is nothing less than astounding.

Alan K. Dolliver
President
Credit Finance Service, Inc.
Wilmington, Del.

► We stand with what we told Mr. Reich: There's an important distinction between the activities a company encourages for the morale and well-being of its employees and those in which it engages on a business basis in competition with others. We happen to think it's out of order to accuse some 8000 manufacturing companies of promoting socialism because they encourage setting up credit unions for their employees.

With regard to the original article (in which we expressed no editorial point of view), the key point is that whether the facts are palatable or not, the activities of 8000 credit unions in manufacturing represent legitimate news.—ED.

"REQUESTS TOO NUMEROUS"

Sir:

We have received numerous requests for the time study and job evaluation booklets described in FACTORY's June Case Book (p. 110). . .

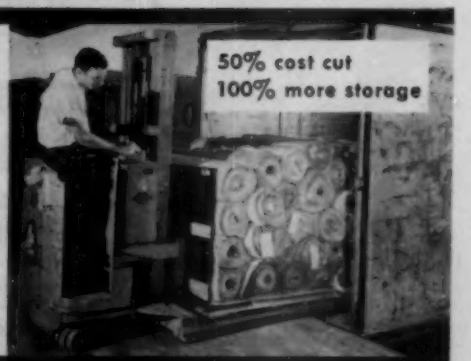
Many letters have contained monies covering the reported cost of

Whatever you handle – do it better the L-S way...

METAL PARTS Two L-S "Walkies" are saving a Connecticut manufacturer 36 man-hours a month in the shipping room alone. They chose L-S electrics because of their smokeless, odor-free operation.

PAPER A Massachusetts paper manufacturer saves 2500 man-hours a year with an L-S electric fork truck, an L-S electric tiering truck and an L-S electric "Walkie". Total operating costs for all of these trucks is just 98¢ per 8-hour day and they effect a 20% savings in storage space.

TEXTILES A finishing plant in North Carolina increased storage space 100% and cut handling costs in half with four L-S electric trucks. Records show these savings actually repaid the entire original cost of the truck in less than one year.



Experienced L-S representatives and the complete job-tailored line of L-S materials handling equipment can provide a better answer to any handling problem.

L-S LEWIS-SHEPARD®

The MASTER® Line — The COMPLETE Line of Materials Handling Equipment

LEWIS-SHEPARD PRODUCTS, INC. • 1510 Walnut Street • Watertown 72, Massachusetts

Please send me the following case histories (outlined above) showing how LEWIS-SHEPARD equipment saved dollars by the economical handling of

☐ PAPER ☐ TEXTILES ☐ METAL PARTS

NAME..... TITLE.....

COMPANY..... CITY..... ZONE..... STATE.....

Dust Control is a job for Engineers

The "rule of thumb" methods of the inexperienced, or the "engineering rules" of an experienced design, fabrication, and installation firm—which will you select for your dust control problems?

Kirk and Blum offers you...

ENGINEERING—a staff of qualified engineers with proven ability to solve your dust control problems.

RESEARCH—continuous research on full scale equipment, to develop the most efficient systems.

EXPERIENCE—over 50 years of dust control service to the woodworking industry.

Every Kirk & Blum installation is based on a complete service: Design — Fabrication — Installation, backed by K & B's acceptance of One Undivided Responsibility for the system to assure your satisfaction.

On your dust control problem consult Kirk and Blum, craftsmen in dust control for the woodworking industry, where fine craftsmanship is appreciated. The Kirk & Blum Manufacturing Company, 3209 Forrer St., Cincinnati 9, Ohio.

KIRK & BLUM DUST CONTROL SYSTEMS

FACTORY / LETTERS

Begins on page 8

the booklets. Some have requested large supplies for distribution. . .

We sincerely appreciate these letters and would like to accommodate each and every request, but they are too numerous and the booklets are not available in quantities. We are returning any monies received, along with one copy of the booklets.

The manuals mentioned in the article are distributed only within our own organization since they are tailored for our production.

E. H. Rodgers
Director, Industrial Relations
Penna. Transformer Div.
McGraw-Edison Co.,
Canonsburg, Pa.

► The number of requests was such that Mr. Rodgers had to prepare a duplicated form letter similar to the above. We apologize for the trouble and inconvenience caused Mr. Rodgers, and also congratulate him for his excellent handling of a situation that got out of control through no fault of his own.—ED.

"SELF-SERVICE" STORES

Sir:

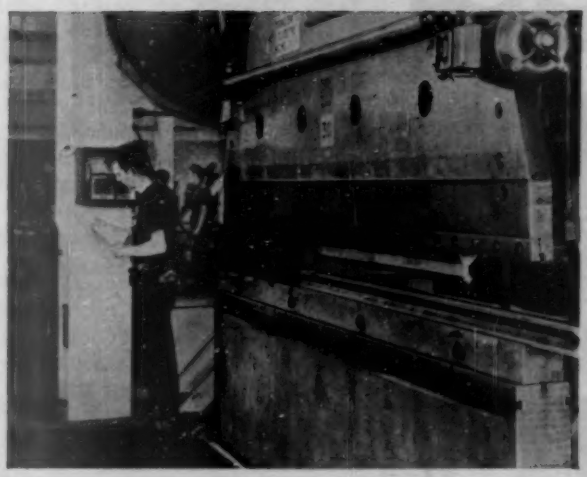
Your article in June FACTORY ("Case Book," p. 97) showing a self-service maintenance storeroom at the Air Force Arnold Engineering Development Center is backing for my suggestion to set up a similar system for our maintenance material crib and general stores. However, it would help in selling the idea if it could be shown that this system is successfully in operation at an industrial plant. Do you know of any such system that we could get information on? I would appreciate any help you could give me.

Name Withheld

► We'd been hoping industry had outgrown the attitude that any idea being used by the Armed Services is automatically suspect; in general, we think it has, even if a few individuals continue to think this way, as appears to be the case with someone in your "chain of command."

We can assure you that self-service storerooms are not uncommon in industrial plants. For example, we described the use of rotary bins for

How Canadian General Electric Gets Up-to-the-Minute Cost Data at Less Expense!



When starting and finishing a job, employee talks into nearby Executone, reporting clock number, job, and machine numbers to centralized timekeeping office. No time is lost walking to make reports, waiting in line, visiting with friends.

When call comes in, girl records all data on pre-punched cards. Data is processed and analyzed by management within hours instead of weeks. Errors are spotted quickly, corrective action can be taken while job is still running.

Executone reduces time lag by two weeks— Savings more than pay for system!

At the Canadian General Electric plant at Guelph, Ontario, Executone Centralized Timekeeping has proved itself an invaluable management tool—

- Three girls now handle the work. Elimination of in-plant timekeeping released eight employees for other duties.
- Labor costs are compiled within 24 hours instead of two weeks.
- Employees gain productive time because less time is lost walking, waiting and visiting when making job reports.
- Down time is cut. Machine breakdown, lack of materials, etc., are reported immediately. Corrective action is taken while job *is still running.*
- CGE has gained 700 sq. ft. additional production space by eliminating Timekeeping Centers.

Executone Can Do It For You!

With Executone, data gathering becomes an easy way to obtain your labor cost information at the source and channel it directly from the factory floor to a centralized timekeeping office in a matter of *seconds.* No matter what the size of your operation, your local Executone man can help you plan a system to fit your exact requirements. For full information, send coupon below today.

Executone
CENTRALIZED TIMEKEEPING SYSTEMS

Executone, Inc., Dept. R-18, 115 Lexington Ave., N.Y. 17, N.Y.
Without obligation, please send me the following Centralized Timekeeping Information:

☐ Production Control ☐ Incentive Plan Control
☐ Cost Control ☐ Other Case Histories
☐ Name of Local Representative

Name_____
Company_____
Address_____
City_____ Zone____ State_____

In Canada—331 Bartlett Ave., Toronto

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 1 ton capacites—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

WRITE OR WIRE FOR COMPLETE CATALOG AND NAME OF YOUR LOCAL DISTRIBUTOR

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

FACTORY / LETTERS

Begins on page 8

this purpose on p. 114 of the December 1957 issue (at Stauffer Chemical Co., Richmond, Calif.). Obviously, the "store counter" arrangement was more suitable for the Air Force installation. But the principle is the same.—ED.

WORK SIMPLIFICATION

Sir:

The article "What Makes Work Simplification Work" (July FACTORY, p. 72) is superb. It should do much in promoting the general philosophy of work simplification.

Chester L. Brisley
Director of Industrial Engineering
Wolverine Tube Div.
Calumet & Hecla, Inc.
Allen Park, Mich.

Sir:

I have read the FACTORY interview on Work Simplification. It is an extremely well-written article.

Harve W. Wolfe
Methods Engineer
Industrial Controller Div.
Square D Co., Milwaukee

Sir:

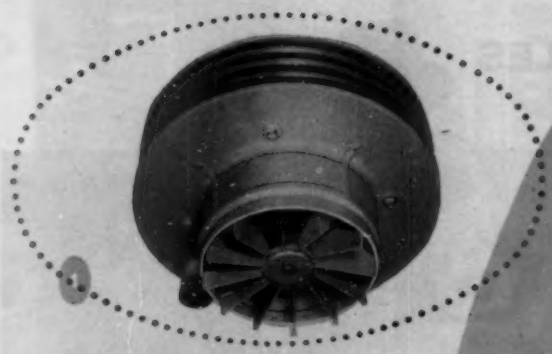
"What Makes Work Simplification Work" is a concise, well-written article which in my opinion is long overdue.

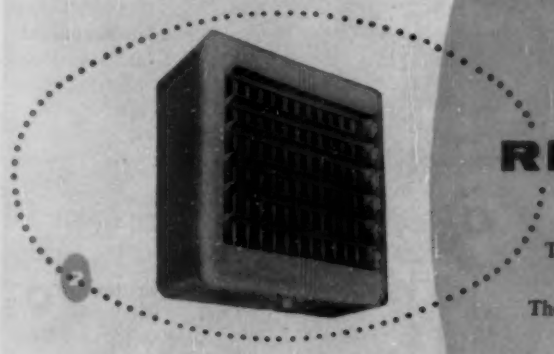
Why can't we have more useful articles like this in FACTORY?

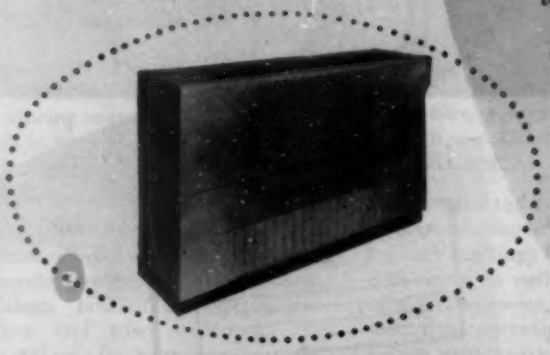
B. F. Feeley
Specialist, Procedures and Data Processing
Portable Appliance Department
General Electric Co., Bridgeport

► Nothing pleases an editor quite so much as to have a reader refer to a 19-page article as "concise." We appreciate the bouquet, and assure Mr. Feeney that reactions like his provide the incentive to make us try even harder to come up with top-flight articles.

Incidentally, all of the writers above ordered reprints of the Work Simplification article—and so have some 200 others, for a total of almost 3000 reprints. A third printing is now on press, and we'll shortly be able to fill orders again at 50¢ per copy. Write: Reader Service Dept., FACTORY, 330 West 42nd St., New York 36.—ED.







McQuay

UNIT HEATERS

For EVERY Need

AND ALL WITH

RIPPLE FIN COILS

McQuay Unit Heaters have modern styling. The attractive cabinets are finished in neutral hammer enamel and blend in well with all surroundings. They are available in an exceptionally wide range of sizes and capacities for either steam or hot water, to enable you to meet the requirements of every job—old or new, large or small. McQuay Unit Heaters will solve any low cost heating problem anywhere, with uniform and quiet delivery of heat and with that extra efficiency afforded by Ripple Fin Coils. Years of experience, years of research provide the know-how for which McQuay is famous.

McQuay Means Quality

1 DOWN FLOW UNIT HEATERS

Capacities from 38,500 to 500,000 BTU/hr. For steam or hot water. Adjustable radial diffusers furnished with each unit. Four types are available.

2 HORIZONTAL UNIT HEATERS

Capacities from 17,700 to 360,000 BTU/hr. For steam or hot water. Adjustable louvers standard equipment. Double deflection grilles available on special order.

3 CABINET UNIT HEATERS

Capacities from 19,700 to 108,000 BTU/hr. For steam or hot water. Designed for fully exposed, semi-recessed or fully recessed mounting on either floor, wall or ceiling.

McQuay INC.

REFRIGERATION
HEATING
AIR CONDITIONING

McQuay, Inc., 1620 Broadway St. N.E., Minneapolis, Minnesota. *Representatives in all principal cities.*

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A Johns-Manville Roof Survey helps to . . .

STOP COSTLY ROOF TROUBLES

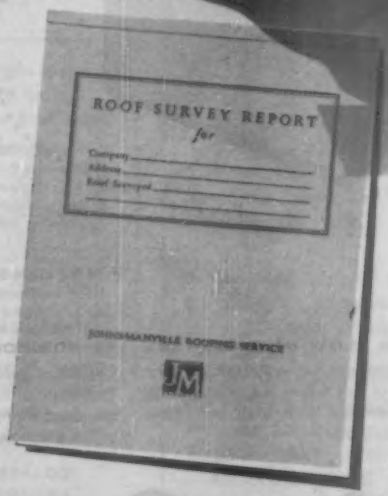
DON'T BE CAUGHT with costly roofing troubles. Even though your roof never has leaked, there may be defects you haven't noticed.

To spot possible trouble, it pays to have your roof inspected by an expert every year or so. And, your J-M Roofing Contractor is the man to do it.

His inspection will cover not only the main roofing areas, but also the flashings, parapet walls, skylights, drains, pent-houses . . . everything on your roof that has a bearing on its ability to keep out the weather.

For a free Roof Survey, call your J-M Roofing Contractor. He is listed in the Classified Telephone Directory.

For further information about what may be happening to your buildings, send for the 40-page booklet, "Things You Should Know About Your Roof." Write to: Johns-Manville, Box 158, New York 16, N.Y. In Canada, write: Port Credit, Ontario.



The J-M Roof Survey is made without obligation. A written report will tell you what defects are found, what you should do and how you can do it.

JOHNS-MANVILLE

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For more facts circle 463 on Reader Service Card >

Pittsburgh COLOR DYNAMICS® Improves Productive Efficiency in New Blaw-Knox Factory

New painting system relieves eye strain, reduces fatigue and provides greater safety for workers in modern road-paving equipment plant at Mattoon, Illinois.

BLAW-KNOX

THE NEW Blaw-Knox plant at Mattoon, Illinois, is another convincing example of the improvement in productive efficiency, safety and morale resulting from the use of Pittsburgh COLOR DYNAMICS.

● **This plant is devoted** to the manufacture of road-paving equipment—concrete pavers, spreaders, mixers, finishers, bituminous paving machines and road wideners. The 300,000-sq. ft. structure was designed by Sverdrup & Parcell, Inc., St. Louis, Mo., architects, and erected by the George A. Fuller Company of Chicago.

● **The interior** of this entire plant was painted according to the principles of COLOR DYNAMICS. The beneficial effects of this painting system are summarized in this comment by A. J. Cox, general manager of the Blaw-Knox Construction Equipment division:

● **"We selected colors** for interior walls and ceiling to create more cheerful surroundings for our workers. Stationary as well as moving parts of machines were painted in colors that help operators see their jobs better. Eyestrain is relieved. Nervous tension and physical fatigue are reduced. Safety colors mark hazard areas and safeguard workers against dangers of time-loss accidents.

● **"Our experience** since opening the plant confirms our judgment that properly planned colors are a boon to management and workers alike. They are an aid to greater productivity. The pleasant environment enhances morale. Our entire work force takes pride in our plant's appearance. Work areas are kept clean, simplifying housekeeping. The cheerful and pleasing appearance helps us to recruit new employees in an area where skilled labor has been hard to get. And we enjoy all these benefits at no greater cost than conventional painting."

● **This new Blaw-Knox plant** is only one of thousands of factories in which productive efficiency has been improved by the use of COLOR DYNAMICS. Try it in your plant—in a department or on a machine or two—and see the difference it makes.

Let us Make a Color Plan of Your Plant—It's FREE!

● We'll be glad to mail you a free copy of our fully-illustrated book on COLOR DYNAMICS for industry. It explains what this painting system is and how to use it. It contains scores of practical suggestions. Better still, we'll be glad to prepare a comprehensive color plan of your factory, without cost or obligation. Call your nearest Pittsburgh Plate Glass Company branch and arrange to have our representative see you. Or mail coupon at right.

Send for a Copy of this FREE Book

Pittsburgh Plate Glass Co., Paint Div., Department FM-108, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your booklet "COLOR DYNAMICS."

☐ Please have your representative call for a COLOR DYNAMICS survey without obligation on our part.

Name_____

Street_____

City_____ County_____ State_____

PITTSBURGH® PAINTS

SYMBOL OF SERVICE FOR SEVENTY-FIVE YEARS

75th ANNIVERSARY 1883 – 1958

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

"Off-the-shelf" delivery

— another example of how you benefit when you install American Blower heating equipment

You're money ahead when you choose high-quality, low-cost American Blower Venturafin® Unit Heaters for either replacement or new installation.

Here's why: Both vertical and horizontal designs are available "off-the-shelf" from *local* stock in most models and sizes—so you can count on delivery on time. And Venturafin Unit Heaters are easy to install and economical to operate . . . waste no floor or wall space, warm without time lag to ideal comfort conditions, can fit into steam or hot water systems. In addition, they offer you these important benefits:

- **Packaged heating**—fast installation. Complete, ready to use with simple connections to steam or hot water.
- **Pre-engineering**—sizes to handle all requirements. Just pick the right unit from the catalog. No on-the-job engineering required.
- **Certified ratings**—meet rigid unit-heater test codes.

For more information, check with your architect, engineer, or heating contractor. Or write us direct: American-Standard,* American Blower Division, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

It pays to standardize on American Blower!

Gas-fired unit heaters — rugged; 50,000 to 230,000 Btu/hr. input.

Cabinet heaters — attractive, quiet. Models for steam or hot water.

Industrial heaters—available through American Blower branch offices.

* American-Standard and Standard ● are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard
AMERICAN BLOWER DIVISION

RCA RADIO...FIRST CHOICE OF THE LEADERS

NOW...A 2-Way "Belt" Radio ...for constant control of roving maintenance men!

Indoors or outdoors . . . with RCA's Personalfone "Belt" Radio, your roving mechanics and service men can now be as closely controlled as your truck crews! This new 2-way transistorized battery radio lets you communicate with them wherever they are working. No longer is it necessary to wait for their return, or waste time in locating them. They're at your fingertips for instant 2-way contact whether you're at your desk, on foot, in a parked or moving vehicle.

RCA's Personalfone "Belt" Radio consists of a miniature transmitter and receiver which mount in a double pouch on worker's belt. Comes equipped with antenna, battery, microphone, speaker or earphone. Use RCA's Personalfone on mechanics away from vehicles and integrate with 2-Way Radio in mobile equipment, assuring communications that only the leader in radio and electronics can offer. Expert service by RCA's own communications technicians.

Find out more about this amazing equipment! Mail coupon.

TYPICAL USES:

- **Taking a man off one job to go to an emergency!**
- **Assigning new work!**
- **Calling dispatcher for help, materials, orders!**

Personalfone

2-WAY "BELT" RADIO

RCA

Tm(s)®

RADIO CORPORATION of AMERICA

COMMUNICATIONS PRODUCTS

CAMDEN, N.J.

Radio Corporation of America
Communications Products
Dept. L-48, Building 15-1, Camden, N. J.
In Canada: RCA VICTOR Company Limited, Montreal.
Please send me full particulars about

☐ RCA's Personalfone "Belt" Radio.

☐ RCA's "Carfone" Radio for 2-way Communications.

NAME _____ TITLE _____
(PLEASE PRINT)

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ COUNTY _____ STATE _____

☐ Have Communications Representative call.

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For more facts circle 465 on Reader Service Card

NEW! America's first

TOE pressure for **FORWARD**
HEEL pressure for **REVERSE**
...smooth, accurate **"INCHING"**
...response is **INSTANTANEOUS!**

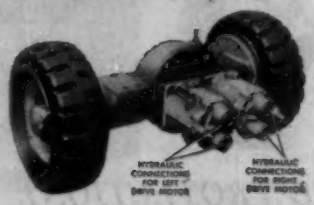
foot-controlled power transmission!

Unique method of instant power application introduced in Towmotor Fork Lift Trucks

TOWMOTOR *TOWMOSTATIC* DRIVE

It's really history-making!

NO clutch assembly
transmission
drive line
differential
gearshift lever



Twin Motors Power Drive Wheels!
Two positive-action piston-type motors transmit full power to drive wheels. Due to variable displacement characteristics of the motors they automatically adjust to torque and speed requirements demanded by driving conditions.

Towmostatic Drive is a Towmotor engineering achievement based on the principle of Hydrostatics . . . an entirely new method of pedal-controlled power transmission that simplifies lift truck operation, reduces hand movements to minimum, cuts maintenance costs and downtime sharply.

With this new drive Towmotor lift truck operators control *all forward and reverse travel* with their left foot on a treadle-type pedal—a natural heel-and-toe action. To go forward, simply press down with toe. To reverse, press down with heel. Response is instantaneous and glider-smooth operation is easily mastered with a few minutes' practice!

Conventional mechanisms eliminated

Towmotor Towmostatic Drive is the first method of power transmission to eliminate clutch assembly, transmission, drive line, differential, plus entire shifting mechanism. Many of the major causes of costly maintenance and downtime are thus eliminated.

Operating benefits are many

Smooth, accurate "inching" that simplifies stacking of goods is also obtained through Towmotor Towmostatic Drive. Maneuverability is unsurpassed—acceleration fast—gradeability greatly improved—lifting speed is integrated with drive control for maximum mass-handling.

Ask for Towmostatic Drive Booklet

Complete information on this revolutionary Towmotor power transmission is detailed in new illustrated booklet. Write to Towmotor Corporation, Cleveland 10, Ohio.

Leaders for 39 years in building Fork Lift Trucks, Tractors and Carriers

TOWMOTOR THE ONE-MAN-GANG **-GERLINGER**

Gerlinger Carrier Company is a subsidiary of Towmotor Corporation, Cleveland 10, Ohio

DON'T GAMBLE WITH HAND PROTECTION!

Keep 'em on the job with gloves that fit the job

No matter what chemical or solvent they're working with, there's a Wil-Gard Glove to fit the job. Seven quality lines . . . over 70 styles provide dependable hand protection in over 200 different industrial chemicals. Wil-Gard gloves are tough and durable . . . scientifically designed to provide extra comfort, maximum finger and hand flexibility.

Before you specify *any* industrial glove,
check your Wil-Gard Distributor.

WIL-GARD

Sold only through Distributors

FREE! WIL-GARD CATALOG makes it easy to specify the right glove. Charts show lengths, weights and finishes. Write for your copy today!

WR-658-28

PROTECTION FOR THE HANDS OF INDUSTRY • SINCE 1916

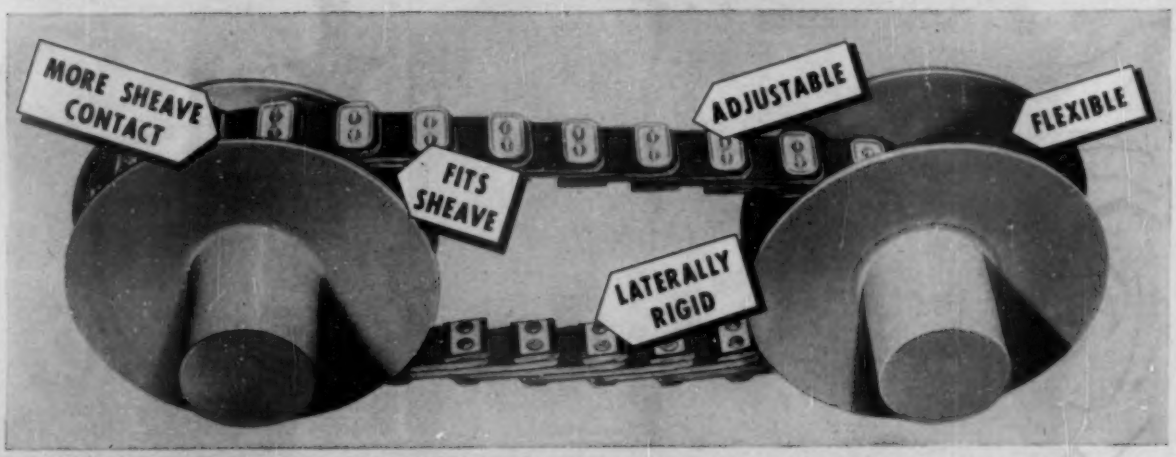
WIL-GARD

THE WILSON RUBBER COMPANY INDUSTRIAL DIVISION CANTON 6, OHIO

A Division of Becton, Dickinson and Company

NEW! MANHEIM VARIABLE SPEED BELT

Replaces Enclosed Drive Belts Without Disassembly!



MVS Belt on a rotary annealing furnace drive gives dependable service even under extreme oil, dust and 200° F. operating conditions.

INSTALLS IN MINUTES INSTEAD OF HOURS— NO MACHINE DISASSEMBLY

A typical installation of a 2" MVS Belt operating an industrial production machine.

MVS BELT makes wood block and variable speed v-belts completely out-of-date

MVS Belt sets a new standard in V-to-V drives because it is adjustable to any length and is installed in minutes instead of hours.

Its patented design eliminates drive disassembly. MVS Belt is placed around the sheaves and coupled with T-screws and cup-washers, reducing down-time to a matter of minutes. Inventory costs are cut by eliminating the need to stock standard lengths. You can make as many as 25 sizes of variable speed belt from a single package of MVS Belt in a given top width. Each package contains 100 links, approximately 13 ft. Available in 26 widths from 1½" thru 5".

FREE LITERATURE SHOWS HOW MVS BELT DOES A BETTER JOB

Uniform thickness and width guarantee constant power delivery at all speeds with no cross-sectional distortion. MVS uniform links assure a perfectly balanced drive that reduces vibration and improves production quality. Priced to offer you big savings. *Write today for complete details on the new MVS Belt.*

★ ADJUSTABLE TO ANY LENGTH
★ GUARANTEES CONSTANT POWER DELIVERY
★ REDUCES VIBRATION UP TO 90%

MVS

MANHEIM
MANUFACTURING & BELTING CO.
Manheim 2, Pennsylvania

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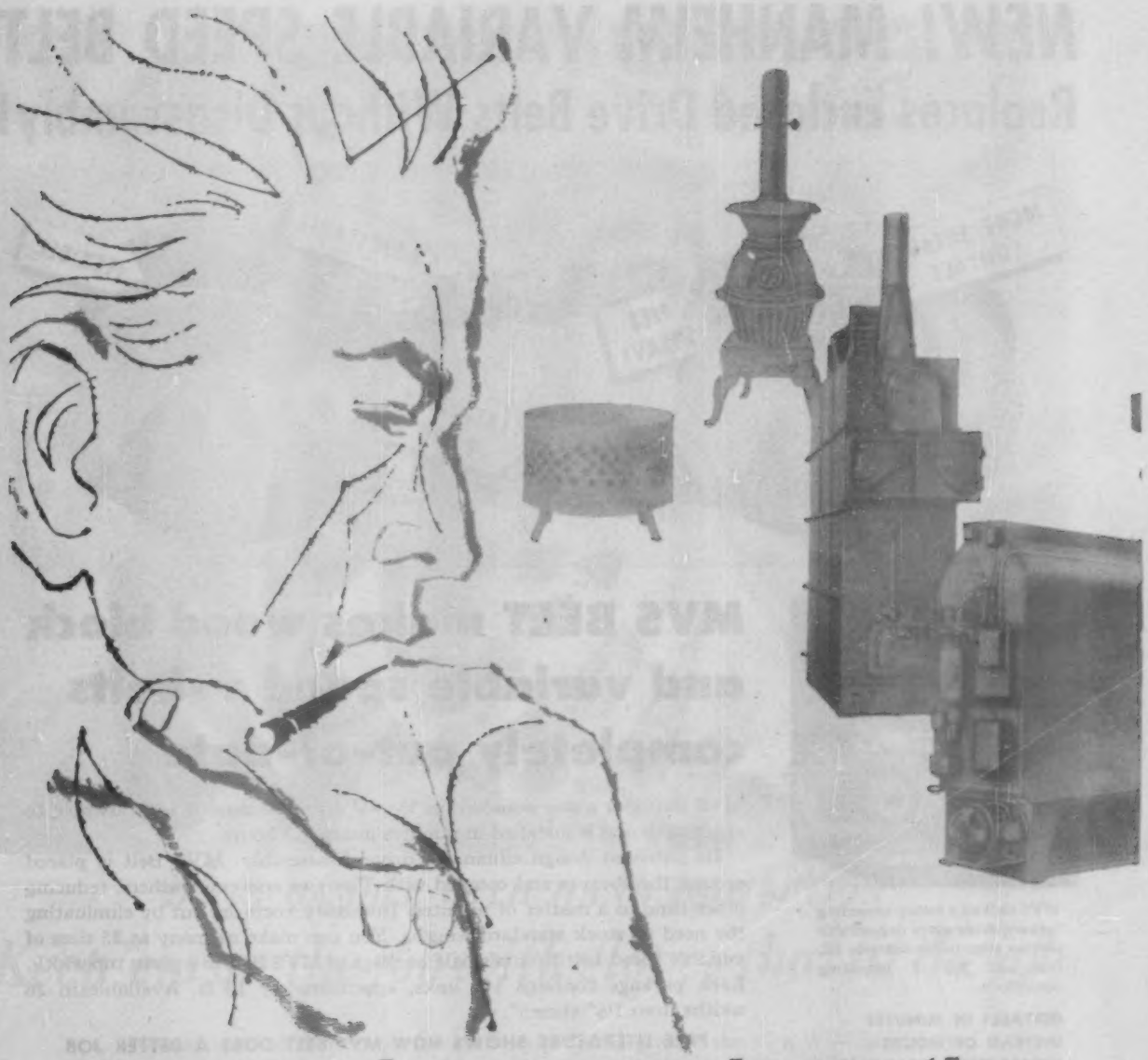


Know-how makes the

IN HEATER APPLICATION

The new Dravo *Counterflo* has performance built in . . . the kind of performance possible only in a heater in which every part has been designed and built to function as an integrated unit. But it is the skill with which this performance is applied to the solution of a specific heating problem that makes it completely effective.

This is the important "extra" that every Dravo Heater customer gets. *Every* Dravo technical representative *is a qualified heating engineer* skilled at solving all kinds of heating problems in all types of industrial and commercial buildings.

Every man is competent to make a complete heating survey of your installation, working in cooperation with your engineering departments or consultant.

Every man is backed by the home office staff, who can bring both laboratory facilities and the total experience of over 10,000 installations to bear on unusual problems.

Get the benefit of this Dravo "extra" when *you* have a heating problem.

difference

IN HEATER DESIGN

The new Dravo *Counterflo* heater, developed by an exhaustive research program, represents an important advance in warm air space heating. Its "unitized" design, making each part integrate smoothly with the functioning of the rest, and the fact that each part was designed specifically for its function, makes the new *Counterflo* unique.

DRAVO
CORPORATION

Here are some of the features which make the new *Counterflo* heater your best heating buy:

NEW PYROJET BURNER—exclusively Dravo—first burner developed specifically for direct-fired space heaters. Burns low cost oils efficiently. Switches from gas to light oil automatically.

NEW INDUCED DRAFT FIRING—automatically controls fuel/combustion air ratio, high negative pressure in combustion chamber adds extra safety; extra efficiency because of complete control of combustion air.

NEW AIRFOIL COMBUSTION CHAMBER—stainless steel, ribbed for extra strength and channeling of airflow—guaranteed for 10 years. Longest possible flame travel for complete combustion within primary heat transfer area.

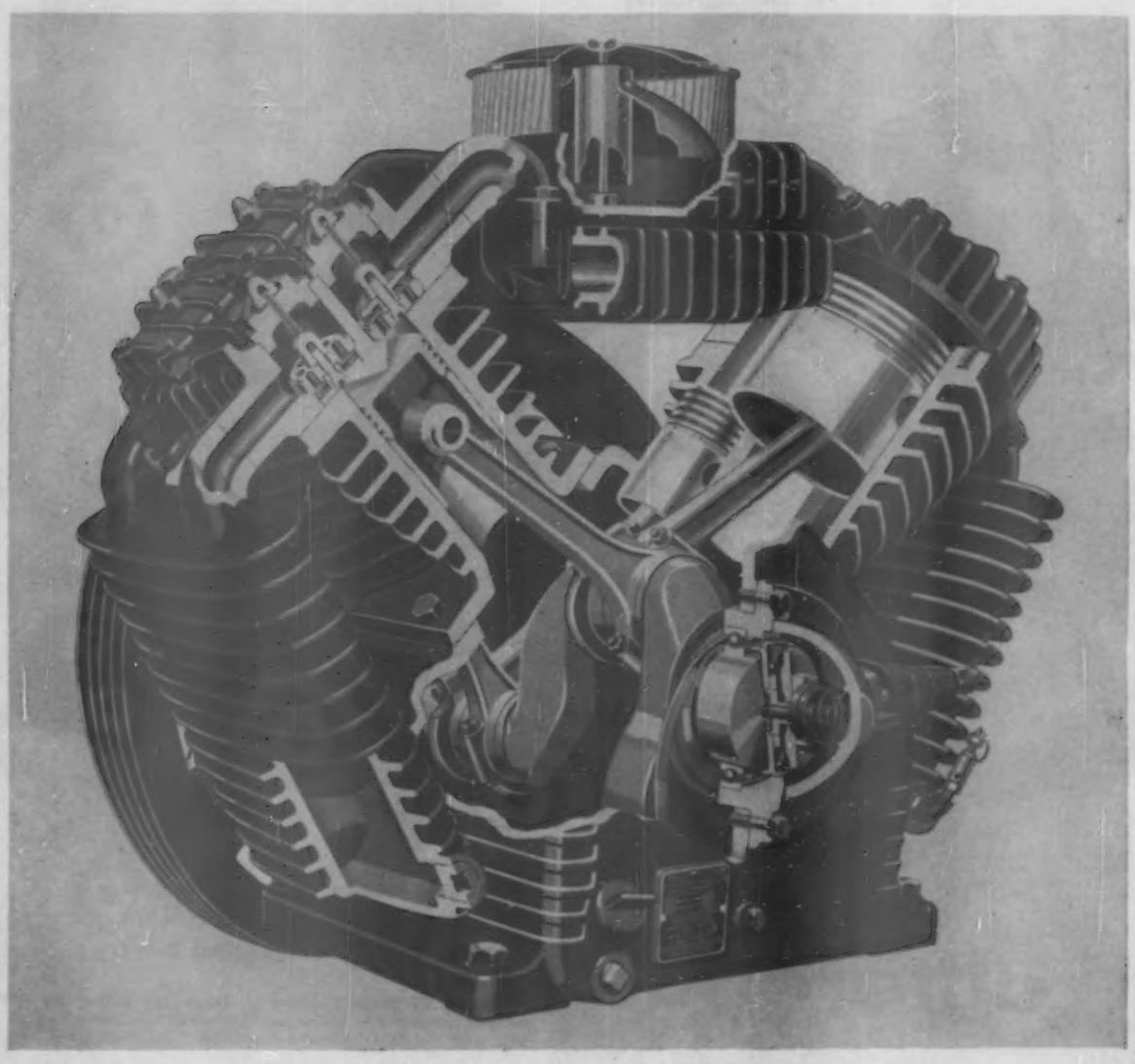
NEW LOW-SPEED FANS—forwardly curved, low-speed, double inlet fans with high efficiency reduce horsepower requirements in the new Counterflo drastically, operating costs are lower.

NEW DISCHARGE PLENUM—distributes heated air at high velocity without annoying drafts. Adds new flexibility to warm air distribution patterns.

Bulletin 564 describes the many new features of the new Dravo Counterflo heater. Write or phone for your copy today. Address Dravo Corporation, Dravo Building, Pittsburgh 22, Pennsylvania.

For more facts circle 469 on Reader Service Card

How DeVilbiss Air Compressors pay for



DeVilbiss Parts Washers. Standard and specially designed metal cleaning units for all requirements.
Write, stating requirements

DeVilbiss Portable Compressors. Take air wherever you need it. ¼ through 15 hp. Compact, yet powerful.
Send for Catalog M-52

DeVilbiss Dust Collectors. Ready-made, completely fabricated units. Need only simple connections.
Send for Dust Collector Catalog

themselves in power savings alone

Low-friction design and precision manufacturing are the secrets . . . giving you as much as 22.6% more air per power dollar!

If you're in the market for an air compressor, don't be misled by purchase price. More important, is the cost of operation. In fact, over the normal life span of a compressor, you can usually expect the cost of its operation to be 2½ to 3 times greater than the purchase price.

As a result of precision design and construction, DeVilbiss can cut these operating costs as much as 22.6%—usually enough savings over the service life of the compressor to pay for its initial cost.

These remarkable savings made with DeVilbiss air compressors are due to their low-friction design — (1) shorter piston stroke (2) slower piston travel (3) ball-bearing mounted crankshaft (4) full-floating piston pins, and (5) controlled oil feed to all bearing and cylinder surfaces.

By reducing losses due to friction, slippage, and heat, these DeVilbiss features not only bring you more air for your power dollar, but lower your maintenance and depreciation costs.

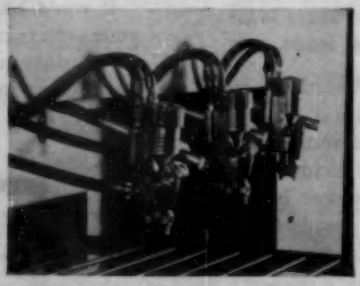
You'll find a complete line of DeVilbiss air compressors—single- and two-stage outfits, from ½ to 25 hp. And your DeVilbiss man will help you select the right one to handle your work most efficiently and economically. Call our nearest branch office; or write us direct for Catalog C-50 on air compressors.

Remember: Air compressors are just one of a complete line of industrial-finishing products offered by DeVilbiss and its subsidiary—DeVilbiss Metal Fabricators Co., successor to the consolidated companies, Peters-Dalton and Newcomb-Detroit.

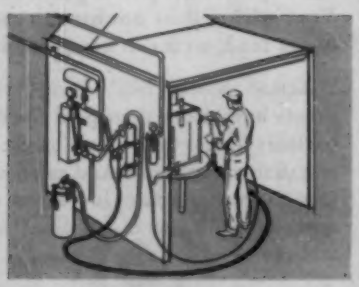
DE VILBISS

THE DEVILBISS COMPANY, Toledo 1, Ohio • Barrie, Ontario • London, England • Branch Offices in Principal Cities

DeVilbiss Automatic Spray Machines coat products of any size or shape, quickly, economically, automatically.
Send for Series I-8000 Bulletins

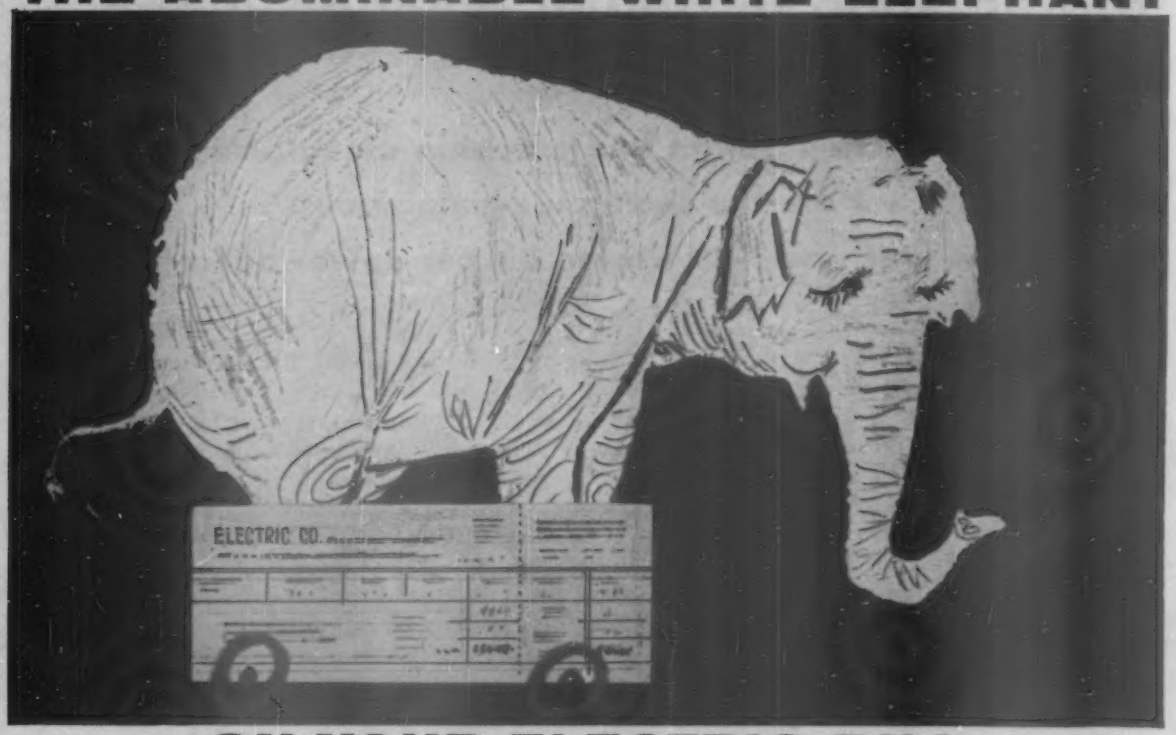


DeVilbiss Automatic Spray Guns increase rate of production; reduce costs to fraction of manual method.
Send for Catalog I-2510



DeVilbiss Hot Spray. Provides heavier film build, with faster drying, less overspray, and fewer rejects.
Send for Bulletins IE-114B and F-286

THE ABOMINABLE WHITE ELEPHANT



ON YOUR ELECTRIC BILL

IF YOUR ELECTRICAL SYSTEM is burdened with a low power factor, you're paying for electricity you can't use... you're giving up electrical capacity you may need.

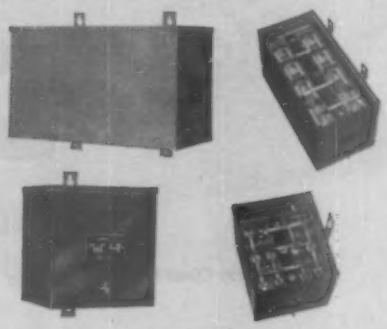
The motors and other inductive devices in your plant use both kilowatts (working current) and kilovars (magnetizing current) in order to run. The kilowatts you buy. The kilovars you can best supply yourself. *The more you supply, the higher your power factor, and the less you pay the electric company.*

Sprague Unipak* Power Factor Correction Capacitors are the most economical and efficient means of supplying your own kilovars. You put them right where they're needed . . . *at the motors.* Your electric company does not have to send as many kilovars all the way from the power plant, so they charge you less. Your wiring does not have to carry the extra kilovars to the load, so it can handle additional loads.

Actual power bill savings experienced in many plants have more than paid for the Power Factor Capacitors in less than a year's time . . . in some cases, in less than six months. And as an added dividend, these capacitors have also increased the power handling capacity of many plant distribution systems by an average of 20%.

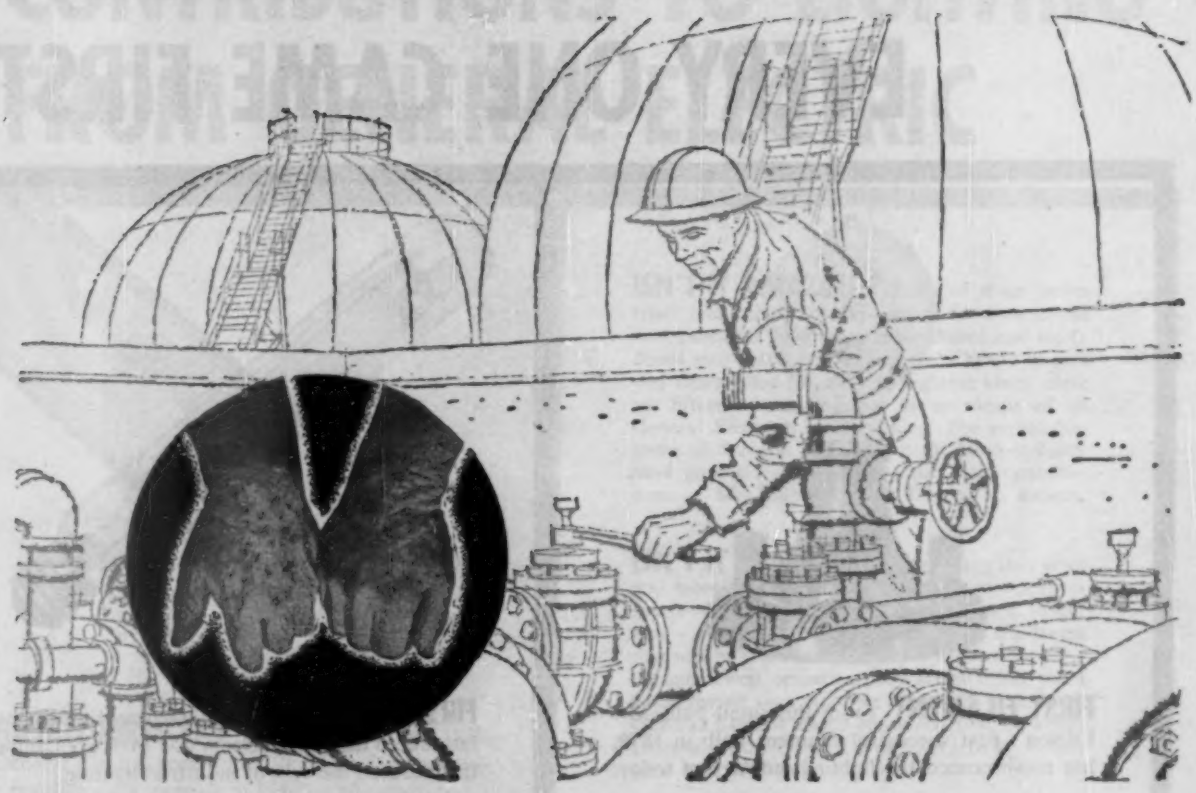
WORLD'S LARGEST
CAPACITOR MANUFACTURER

You, too, can reduce costs... increase your plant's electrical capacity . . . by installing Sprague Unipak® Power Factor Correction Capacitors.



If you'd like *free* assistance in making a survey of your electrical installation to see how *you* can save money with Sprague Unipak* Power Factor Capacitors, write Industrial Capacitor Division, Sprague Electric Co., 355 Marshall St., North Adams, Mass.
*Trademark

SPRAGUE®
the mark of reliability



Why **DERMATITIS** is a needless penalty

Dermatitis caused by industrial materials such as chemicals, oils and abrasives can be prevented. Simply. Inexpensively. With a basic program that safeguards and improves the hygiene of workers — the West Program of Dermatitis Prevention and Control.

How does it work?

No contributing source of dermatitis is overlooked. Specially formulated handcleaners insure personal cleanliness. Antiseptic creams help protect exposed skin areas. "Vinylite" aprons and armguards prevent clothing contamination. Other specialties protect against bacteria infections.

Workers are protected against physical discomfort, lowered morale and lost time.

Management is protected against the costs of medical care, absenteeism, replacement training, sacrificed quality and lost production.

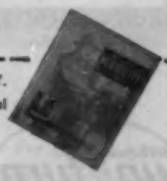
Why not discuss the West Program of Dermatitis Prevention and Control with one of our specialists? His recommendations will help you eliminate the needless penalty of dermatitis. No obligation of course. Just send the coupon.

Programs and Specialties for Protective Sanitation and Preventive Maintenance

WEST CHEMICAL PRODUCTS INC.

WEST DISINFECTING DIVISION

WEST CHEMICAL PRODUCTS INC., 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal



☐ Please send your 24 page booklet "The Control of Dermatitis in Industry."
☐ Please have a West representative telephone for an appointment.

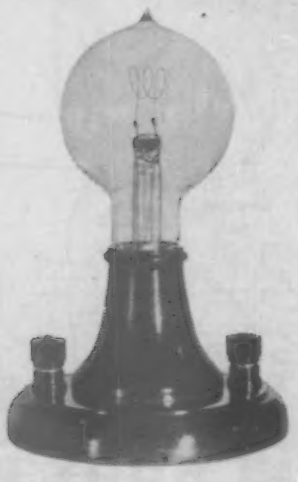
Name.....

Position.....

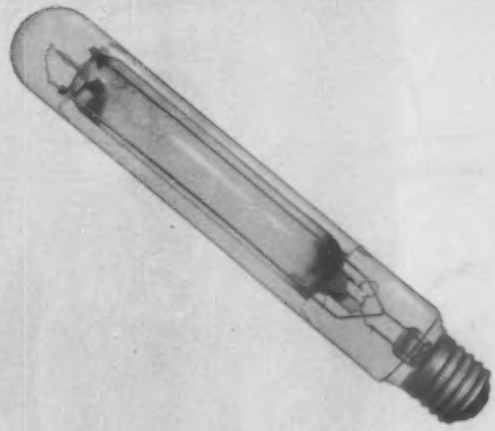
Mail this coupon with your letterhead to Dept. 14

For more facts circle 472 on Reader Service Card

OF THESE 15 OUTSTANDING EVERY ONE CAME FIRST



FIRST FILAMENT From this small bulb, Mr. Edison's first successful filament bulb in 1879, has mushroomed the lighting industry of today.



FIRST MERCURY In 1934, General Electric co-introduced the high efficiency A-1 Mercury Lamps that reduced the cost of industrial lighting.

1938

Precision PAR projector lamps with superb beam control, air-tight seal of lens to reflector.

1942

Instant Start fluorescent gave quicker start, long life because of the G-E triple coil cathode.

1945

Slimline fluorescent with slender, graceful tube for more attractive lighting systems.

1952

RC-1 Mercury Lamp with color improved reflector; phosphor coating increased lamp efficiency 54%.

1954

High Output fluorescent delivered half again as much light as slimlines, more light from equal fixtures.

1954

Quartz Infrared—a powerful, compact new heat source with high concentration of radiant energy.

Progress Is Our Most Important Product

OPERATION upturn

GENERAL ELECTRIC

GENERAL

CONTRIBUTIONS TO LIGHTING FROM GENERAL ELECTRIC

FIRST FLUORESCENT Exactly 20 years ago, 1938, General Electric contributed the first fluorescent—a revolutionary increase in lighting efficiency.

ISN'T IT AMAZING? Each of these lamp types, and improvements in lamps, for commercial and industrial lighting, were developed and introduced into public use by General Electric to give you more value for all your lighting costs. Here are fifteen outstanding, but by no means *all*, of General Electric's contributions. The proud histories of General Electric and the lamp industry have gone side-by-side since the basic contributions of Mr. Light himself—Thomas A. Edison.

ISN'T IT LOGICAL? The company that gives you more value in new lamps and new improvements—and has been making both for a longer time—is also the company that makes the lamps that will be your best bet for day-in, day-out service and lowest operating cost. If you'd like more value for *all* your lighting costs, call your local General Electric Lamp representative, or write: General Electric Co., Large Lamp Dept. C-842, Nela Park, Cleveland 12, Ohio.

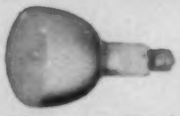
1950

R-52 Reflector Lamp—sealed-in reflector never needs cleaning, 500- and 750-watt sizes.

1952

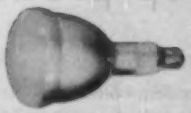
Rapid Start fluorescent brought faster, flickerless starting *without* starters . . . cut maintenance, too.

1952



R-1 Reflector Mercury gave maintenance advantages of inside reflector, plus mercury lamp efficiency.

1955



RB-52—This design improvement made practical a regular glass, 1000-watt reflector lamp for high bay use.

1955

Bonus Line of filament lamps increased light output up to 15% by G-E stand-up filament design.

1956

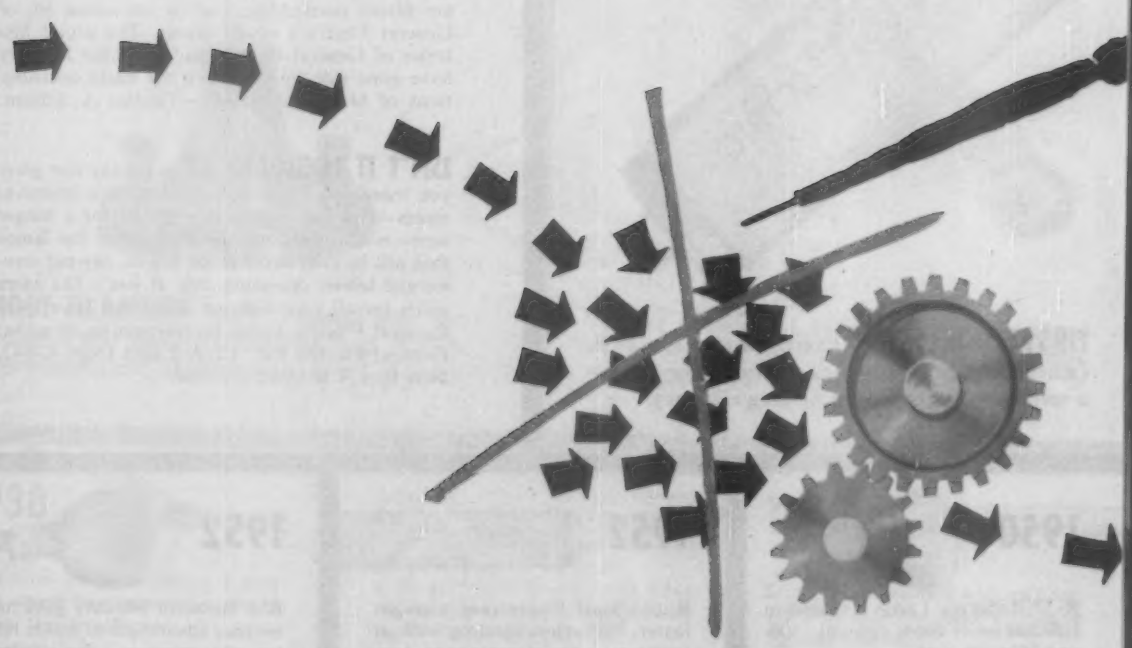
Power Groove—This revolutionary lamp gives 2½ times the light of slimline; saves 5 to 20% on initial cost.

GE ELECTRIC

IT'S A FACT: **Over the past 3 years, General Electric has averaged a new lamp *every other working day!***

For more facts circle 473 on Reader Service Card

Another insurance "extra" from friendly **A**merican **M**utual men . . .



This friendly AM man helps keep production

As much production-minded as accident-conscious, the AM Safety Engineer constantly looks for ways to help AM policyholders increase output as he seeks out danger spots in their plants.

In one AM policyholder plant, for example, an AM Safety Engineer spotted a hazardous and inefficient hand-fed operation. Working with plant supervisory personnel, he helped to design and set up a completely automatic feeding system that rewarded the policyholder several ways. It not only eliminated the dangerous hand feeding, but also greatly reduced employee fatigue—two frequent causes of costly accidents.

flowing by removing hazardous bottlenecks!

What's more, each machine increased production from the former 8,000 to 25,000 units a day.

Safety engineering is another friendly AM "extra" that helps hundreds of AM policyholders, large and small, save lives, limbs and dollars.*

*Pratt & Lambert, Inc., another AM policyholder, saved $68,580 on insurance costs in 7 years through good safety experience . . . gained another $24,760 in AM mutual dividends.

Good reasons for contacting your *friendly* AM *man* right now! American Mutual, Dept. FM-5, Wakefield, Mass.

American Mutual

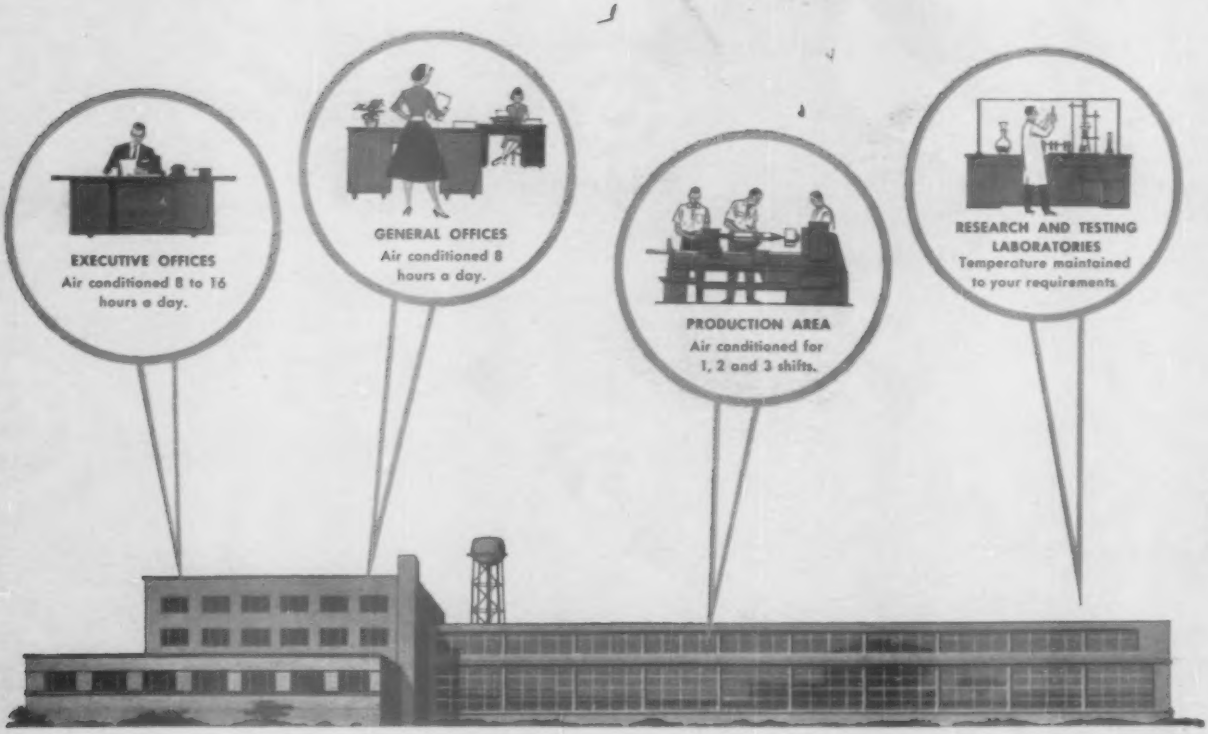
LIABILITY INSURANCE COMPANY

Your friendly AM man can advise you on all your liability insurance needs

Leading writers of Workmen's Compensation, all forms of Liability, Crime, Accident and Health Insurance

Meet the specific "climate needs" of any area with General Electric

ZONE·BY·ZONE Air Conditioning


EXECUTIVE OFFICES
Air conditioned 8 to 16 hours a day.
GENERAL OFFICES
Air conditioned 8 hours a day.
PRODUCTION AREA
Air conditioned for 1, 2 and 3 shifts.
RESEARCH AND TESTING LABORATORIES
Temperature maintained to your requirements

Air- and Water-Cooled Units—up to 30 tons water-cooled, 20 tons air-cooled. Note smooth lines—no outside fan motors, filters, controls or other protruding parts. Take only 77" x 43" of floor space.

Large organizations everywhere are recognizing the advantages of General Electric's Zone-by-Zone method of air conditioning. Installation without major alterations or work stoppage. Individual control of each unit—shutdown of one in no way disturbs the others. You cool only the zones you want, when you want, to the degree you want. Space is no problem—floor-mounted units may be stationed in or away from area served—ceiling-mounted units take no floor space. Install units step-by-step as your budget permits—flexible long term financing available on large installations.

Installation after installation has proved that large projects can be air conditioned more efficiently, at less cost, using General Electric Factory-Assembled Central Station Units for Zone-by-Zone installation. Planning is simplified—need for elaborate equipment rooms eliminated—and you have a choice of air- or water-cooled equipment. For full details have your architect or consulting engineer contact your General Electric Contractor. For free booklet on G-E Zone-by-Zone air conditioning write to: General Electric Co., Air Conditioning Department, Troup Highway, Tyler, Texas.

Progress Is Our Most Important Product

GENERAL ELECTRIC

In Canada, Canadian General Electric Co., Ltd., Montreal

For more facts circle 475 on Reader Service Card

For more facts circle 476 on Reader Service Card ➤

an unusual new material to build equipment quickly, easily, economically

new AIM® BRAND slotted angle

Where you can get AIM Brand Slotted Angle

ALABAMA
Birmingham, Moore-Handley
Mobile, Moore-Handley

ARIZONA
Phoenix, Garrett Supply Co.
Graybar Electric Co., Inc.
Tucson, Graybar Electric Co., Inc.

CALIFORNIA
Fresno, Graybar Electric Co., Inc.
Long Beach, Graybar Electric Co., Inc.
Los Angeles, Robert H. Braun Co.
Garrett Supply Co.
Graybar Electric Co., Inc.
Oakland, Graybar Electric Co., Inc.
Rialto, Robert H. Braun Co.
Sacramento, Graybar Electric Co., Inc.
San Bernardino, Graybar Electric Co., Inc.
San Diego, Robert H. Braun Co.
Graybar Electric Co., Inc.
San Francisco, Graybar Electric Co., Inc.
C. W. Marwedel
Santa Ana, Graybar Electric Co., Inc.

COLORADO
Denver, M. L. Foss, Inc.
Grand Junction, Salt Lake Hardware Co.

CONNECTICUT
Bridgeport, The Lindquist Hardware Co.
Hartford, L. L. Ensworth & Son, Inc.
New Haven, Graybar Electric Co., Inc.

DELAWARE
Wilmington, Hudson Supply Co.

DISTRICT OF COLUMBIA
Washington, Carey Mach. & Supply Co., Inc.

FLORIDA
Jacksonville, Georgia Supply Co.
Miami, Harry P. Leu, Inc.
Orlando, Harry P. Leu, Inc.

GEORGIA
Atlanta, Pye-Barker Supply Co.
Augusta, Augusta Mill Supply Co.
Savannah, Georgia Supply Co.

IDAHO
Boise, Salt Lake Hardware Co.

ILLINOIS
Aurora, Dietz Industrial Supply Co.
Chicago, Efengee Elec. Supply Co., Inc.
Englewood Elec. Supply Co.
Great Lakes Supply Corp.
Samuel Harris & Co.
Harry Lee & Sons
Max A. R. Matthews & Co.
Joliet, Barrett Hardware Co.
Peoria, Hagerty Brothers Co.
Rockford, Englewood Elec. Supply Co.
Samuel Harris & Co.
Rock Island, Dikcon Co.
Waukegan, Samuel Harris & Co.
Interstate Electric Supply Co.

INDIANA
Elkhart, C. S. Kegerreis Supply, Inc.
Evansville, Evansville Supply Co.
Fort Wayne, National Mill Supply, Inc.
Gary, Englewood Electrical Supply Co.
Hammond, Standard Equip. & Sup. Corp.
Indianapolis, Central Rubber & Sup. Co., Inc.
South Bend, Englewood Elec. Supply Co.

IOWA
Des Moines, Iowa Mach. & Supply Co.

KENTUCKY
Louisville, Noll-LaVielle Supply Co.

LOUISIANA
Monroe, Weeks Supply Co.
New Orleans, Lighting Fix. & Elec. Sup. Co., Inc.
Shreveport, Weeks Supply Co.

MAINE
Portland, Graybar Electric Co., Inc.
James-Wiltsie Co., Inc.

MARYLAND
Baltimore, Cary Mach. & Supply Co., Inc.
Tristate Elec. Supply Co., Inc.
Cumberland, Tristate Elec. Supply Co., Inc.
Frederick, Tristate Elec. Supply Co., Inc.
Hagerstown, Tristate Elec. Supply Co., Inc.

MASSACHUSETTS
Boston, Chandler & Farquhar Co.
Graybar Electric Co., Inc.
Cambridge, Butts and Ordway Co.
Springfield, Graybar Electric Co., Inc.
Standard Indust. Supply Co., Inc.
Worcester, Brierly, Lombard & Co., Inc.
Graybar Electric Co., Inc.

MICHIGAN
Battle Creek, Kendall Hdw. - Mill Supply, Inc.
Benton Harbor, Industrial Equip. Supply Co.
Detroit, The Boyer-Campbell Co.
Fite Electric Supply Co.
Flint, Granedon-Hall & Co.
Grand Rapids, A. L. Holcomb Co.
Kalamazoo, Kendall Hdw. - Mill Supply, Inc.
Lansing, Schaberg-Dietrich Hdw. Co.
Muskegon, Muskegon Hdw. & Supply Co.
Saginaw, Granedon-Hall & Co.
Warren, The Chas. A. Stelinger Co.

MINNESOTA
Duluth, Graybar Electric Co., Inc.
Minneapolis, Graybar Electric Co., Inc.
The Setterlee Co.
St. Paul, Graybar Electric Co., Inc.
Haldeman-Homme, Inc.

MISSISSIPPI
Natchez, Weeks Supply Co.

MISSOURI
Kansas City, Graybar Electric Co., Inc.
Townley Metal & Hdw. Co.
St. Louis, Materials Handling Equip. Corp.
Mill Supply & Machinery Co.

NEW HAMPSHIRE
Manchester, Graybar Electric Co., Inc.

NEW JERSEY
Kearney, A. N. Nelson, Inc.
Morristown, Morristown Elec. Supply Co.
Newark, Graybar Electric Co., Inc.
New Brunswick, Metro Elec. Supply Co.
Trenton, Warren, Balderston Co.
Woodbridge, Hansen & Yorke Co. of N. J.

NEW YORK
Brooklyn, A. N. Nelson, Inc.
Buffalo, Beals, McCarthy & Rogers, Inc.
Long Island City, Graybar Electric Co., Inc.
New York, Allaco Equip. Mfg. Corp.
Hansen & Yorke Co., Inc.
Rochester, Follenabee Metals Corp.
The Sidney B. Roby Co.
Schenectady, Syracuse Supply Co.
Syracuse, Syracuse Supply Co.

NORTH CAROLINA
Charlotte, Industrial & Textile Mill Sup. Co.
Greensboro, Odell Mill Supply Co.

OHIO
Akron, Graybar Electric Co., Inc.
The Hardware & Supply Co.
Chillicothe, The W. H. Kiefaber Co.
Cincinnati, Graybar Electric Co., Inc.
The Scallan Supply Co.
Cleveland, Graybar Electric Co., Inc.
Strong, Carlisle & Hammond
Columbus, The Ross-Willoughby Co.
Dayton, The W. H. Kiefaber Co.
Hamilton, The W. H. Kiefaber Co.
Massillon, The Hardware & Supply Co.
Springfield, The Ross-Willoughby Co.
Toledo, Graybar Electric Co., Inc.
The Stellhorn Co.
Youngstown, Graybar Electric Co., Inc.

OKLAHOMA
Oklahoma City, Marshal Sup. & Equip. Co.
Tulsa, Marshal Supply & Equip. Co.

OREGON
Portland, J. E. Haseltine & Co.

PENNSYLVANIA
Allentown, Wm. H. Taylor Co., Inc.
Bala Cynwyd, Material Handling Equip. Co.
Chambersburg, Tristate Elec. Supply Co., Inc.
Erie, H. P. Weller Supply Co.
Harrisburg, Raub Supply Co.
Lancaster, Raub Supply Co.
Philadelphia, Theo. C. Ulmer, Inc.
Pittsburgh, Frick & Lindsay Co.
Graybar Electric Co., Inc.
Williamsport, Raub Supply Co.

RHODE ISLAND
Providence, Graybar Electric Co., Inc.
Providence Mill Supply Co.

SOUTH CAROLINA
Charleston, Charleston Supply Co.
Greenville, Greenville Textile Sup. Co.

SOUTH DAKOTA
Sioux Falls, Graybar Electric Co., Inc.

TENNESSEE
Memphis, The Riechman Crosby Hays Co.
Nashville, Moore-Handley

TEXAS
Dallas, Towne Industrial Equipment Co., Inc.
Houston, Brents & Co.
Wessendorf, Nolms & Co.

UTAH
Salt Lake City, Salt Lake Hdw. Co.

VERMONT
Rutland, Graybar Electric Co., Inc.

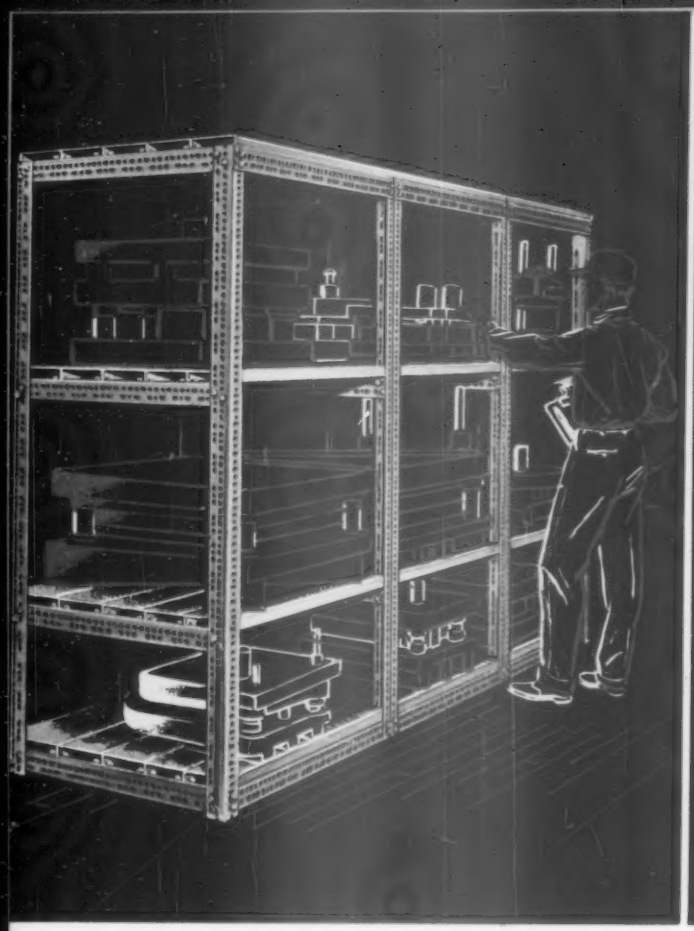
VIRGINIA
Harrisonburg, Tristate Elec. Supply Co., Inc.
Norfolk, Tidewater Supply Co., Inc.
Richmond, Industrial Supply Corp.
Winchester, Raub Supply Co.

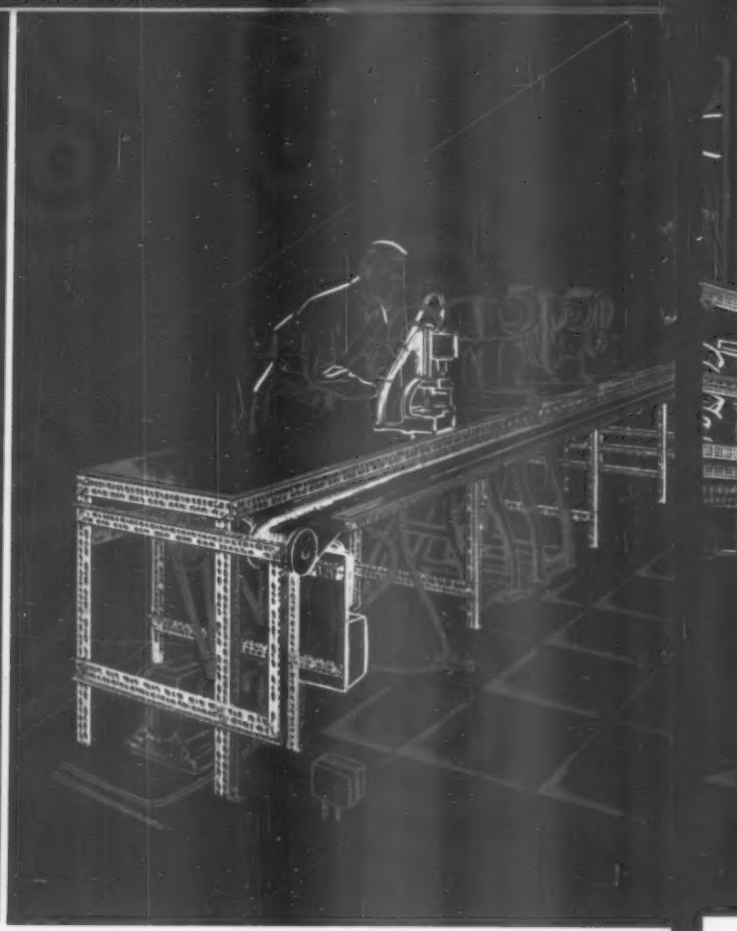
WASHINGTON
Seattle, Cragin & Co.
Spokane, J. E. Haseltine & Co.

WEST VIRGINIA
Charleston, Graybar Electric Co., Inc.

WISCONSIN
Green Bay, W. E. Thew Supply Co.
Milwaukee, Hein Electric Supply Co.

AIM BRAND another Idea material by ACME STEEL COMPANY ACME STEEL

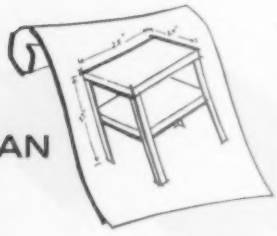




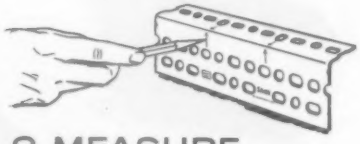
build your equipment needs best...

no welding, no drilling,
no special skills needed...
just

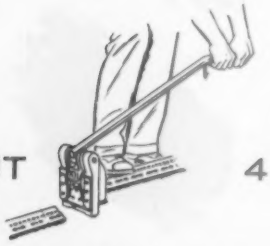
new



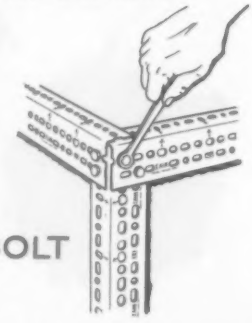
1 PLAN



2 MEASURE



3 CUT



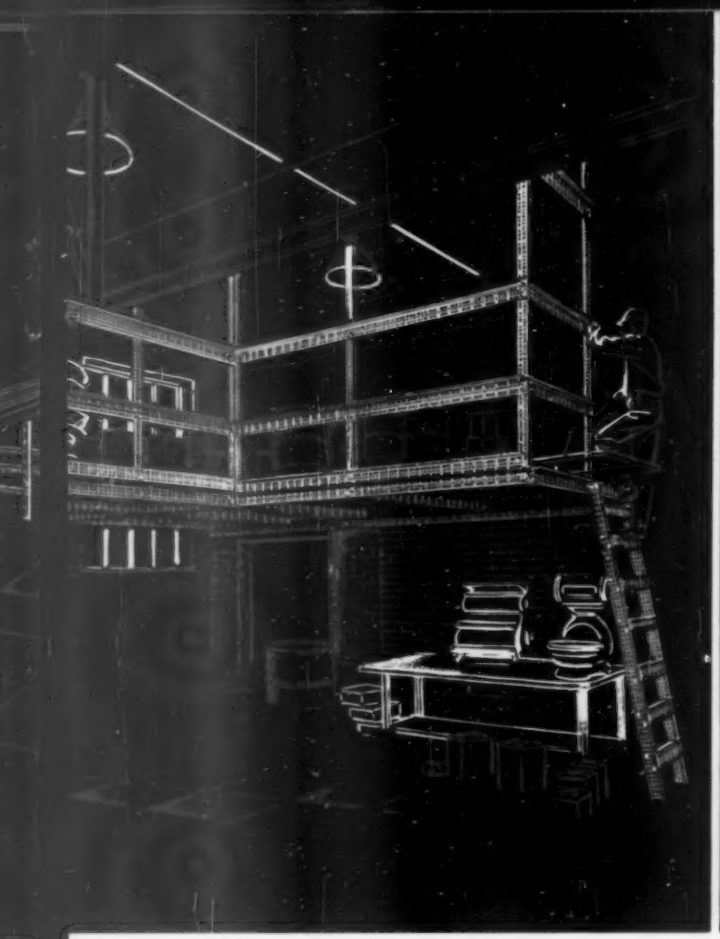
4 BOLT

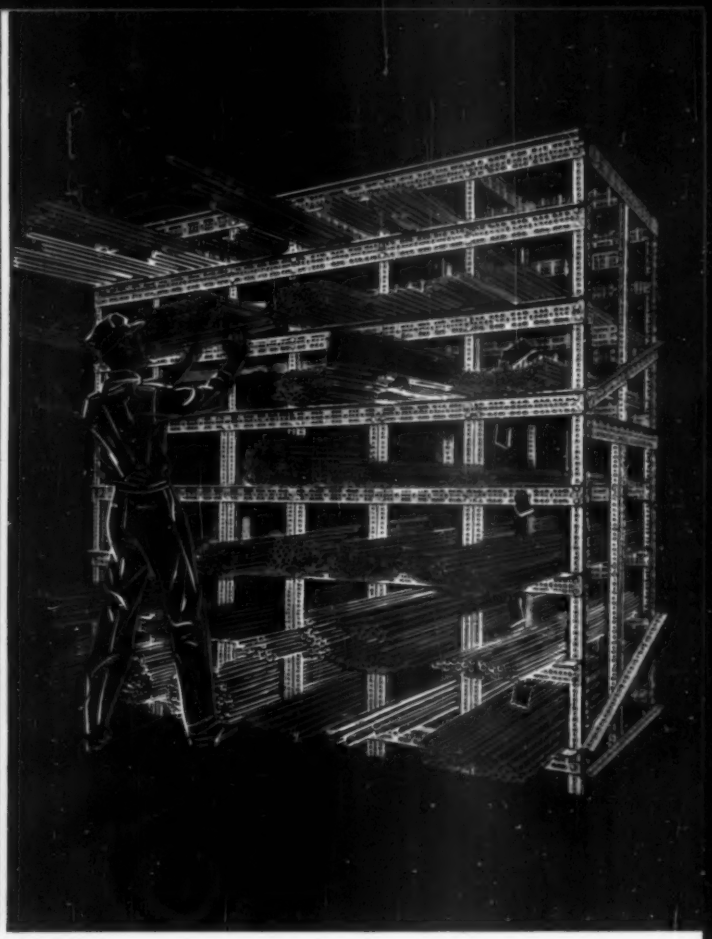
AIM Brand Slotted Angle is cold-rolled galvanized steel, and comes in packages of 10 pieces of 10 or 12 foot lengths, with nuts and bolts included.
Available in two sizes: Standard, 225-80 (2¼" x 1½" x .080") and Heavy-duty, 300-104 (3" x 1½" x .104").

...the superior

AIM Brand Slotted Angle is the quickest, easiest, strongest and most economical material for building unlimited varieties of useful structures and equipment.

Quickest and easiest because the new precision-engineered recurring pattern of slots and holes gives users a combination of easy assembly with great structural strength and rigidity. For installations where assembly convenience is most important, Friction-Joints can be made by bolting through slots. Where maximum joint strength and structural rigidity are required, bolting is done through round holes. Structural bolts, ⅜" in diam-





AIM® BRAND

slotted angle

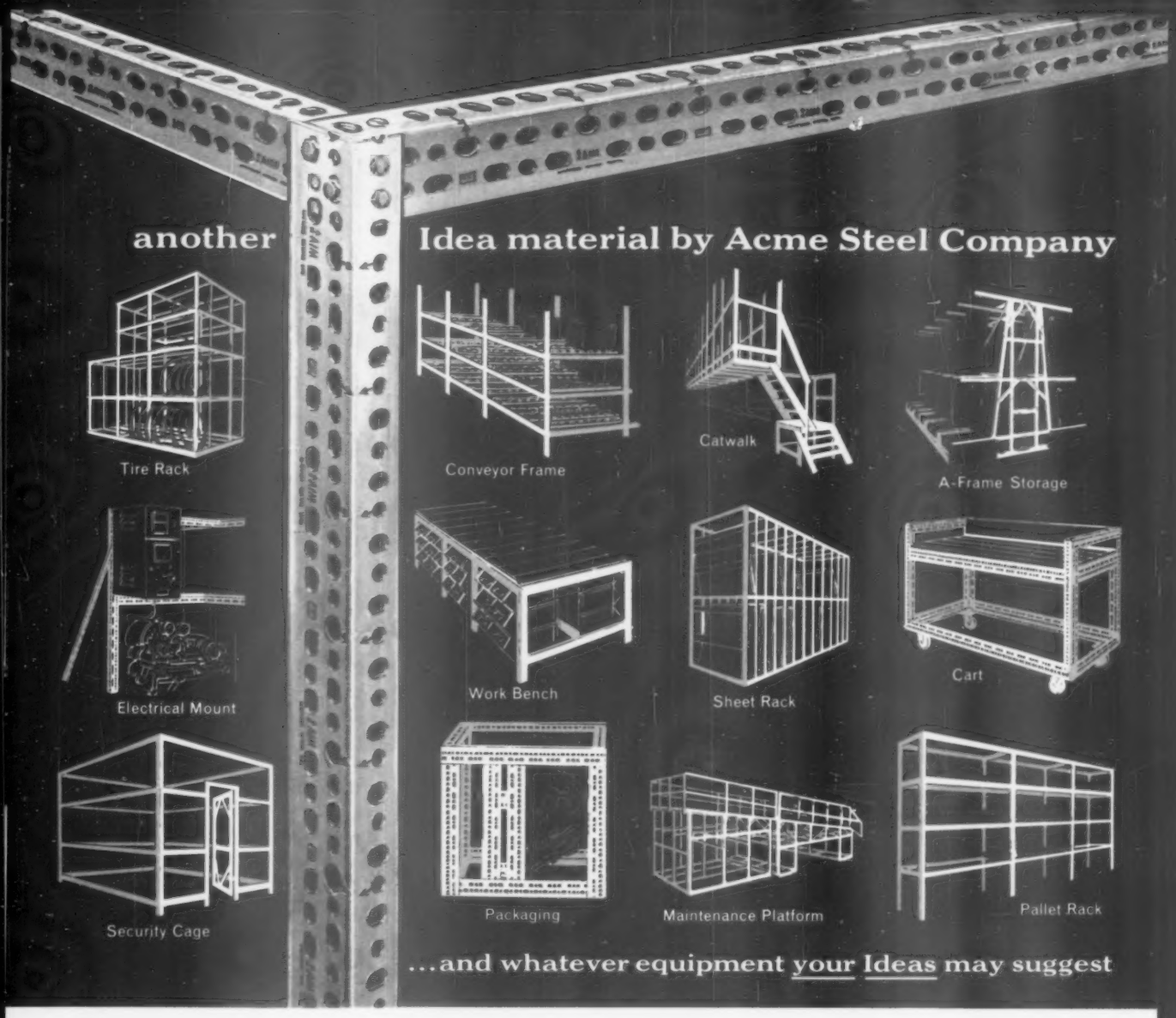
new Acme Steel material

eter, with special full-load shoulders, fit round holes precisely, to form Lock-Joints incapable of slippage or other movement. ⅜" diameter structural bolts each have a safe load capacity of 2000 pounds, and are applied with either an ordinary or a power wrench.

Most economical because you save on materials and manhours with AIM Brand Slotted Angle. Just bolt it and it stays built. No welding or drilling—and AIM Brand Slotted Angle can be reused time and time again.

AIM Brand Slotted Angle is a product of Acme Steel Company, the original U. S. pioneers and developers of slotted angle framing material. Well backgrounded in engineering construction experience, Acme Steel Company has extensive engineering service facilities available for users of AIM Brand Slotted Angle. And Acme Steel Company follows through by providing personal building counsel and construction aids.

For further information on AIM Brand Slotted Angle contact your local Distributor, or write Dept. FAD-108, Fabricated Materials Division, Acme Steel Company, Chicago 27, Illinois.



Idea accessories to use with AIM Brand Slotted Angle

AIM Brand Cutter
AIM Brand #1 Channels
AIM Brand Casters
AIM Brand Steel Panels
AIM Brand Speed Framing Fixtures
AIM Brand ⅜" Full-Shouldered Structural Bolts and Nuts

FABRICATED MATERIALS DIVISION

ACME STEEL COMPANY

CHICAGO 27, ILLINOIS

AIM Brand Slotted Angle

ACME STEEL

AIM BRAND

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How pagemaster® helps keep order in Yankee Stadium

All kinds of things can happen where up to 70,000 excited people gather.

But in New York's famous "Home of Champions" Stadium Manager Jim Thomson can keep close control over events with the help of a PAGEMASTER *Selective Radio-Paging System* by Stromberg-Carlson.

Stadium supervisors and assistant managers, equipped with transistorized, pocket-size PAGEMASTER receivers, are strategically stationed in all parts of the stadium. Mr. Thomson can dispatch any number of them to any area on a moment's notice. Here's how.

When extra men are needed at any locality, the manager has his telephone switchboard operator set the private code signals of the men he wants on the PAGEMASTER Encoder (a compact unit placed next to the switchboard). A flick of a switch puts the calls "on the air."

Instantly, the receivers of the men called (and *only* theirs) respond with a clearly audible tone. The men pick up the telephones near their stations, get their instructions and go into action.

A PAGEMASTER system will give *you* this kind of fast contact with key people—whether you manage a factory, warehouse, hospital, hotel, oil field or school. You can have a system engineered to your requirements, whether you need just a few receivers—or a few thousand. Systems are available for lease or purchase.

For details, contact the PAGEMASTER distributor in your area. Or write to us at 203 Carlson Road.

"There is nothing finer than a Stromberg-Carlson"

STROMBERG-CARLSON

A DIVISION OF GENERAL DYNAMICS CORPORATION

Pagemaster Sales • Rochester 3, N.Y.

Electronic and communication products for home, industry and defense

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Baltimore 18, Maryland
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Birmingham, Alabama
The Lanier Co., 2129 7th Ave. N.
Boston 15, Massachusetts
DeMambro's, 1095 Commonwealth
Buffalo 10, New York
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Camp Hill, Pennsylvania
John A. Morefield Company
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Milwaukee 4, Wisconsin
United Organ Co., 640 W. Va. St.
Minneapolis 3, Minnesota
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New Orleans 20, Louisiana
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Turtle Creek, Penna.
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408 East Main Street
Rochester, New York
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Rockford, Illinois
Elmquist Music & Sound, 1103 Bwy.
Salt Lake City 2, Utah
Standard Supply, 225 E. 6th S.
P. O. Box 1047
San Francisco Bay Area, Calif.
Watson Communication Engineering
10533 San Pablo Ave., Richmond
Seattle, Washington
W. D. Lasater Co., 615 N. 35th St.
Spokane 1, Washington
NW Electronics, E. 730 1st Ave.
Springfield 9, Massachusetts
Valley Sound Corp., 958 State Street
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Toledo, Ohio
Warren Radio Company, 1002 Adams St.
Tucson, Arizona
Hiles Radio & TV Center, 400 N. 4th
Waco, Texas
Waco Communications Co., 1213 Clay
Washington 5, D. C.
Tempo Electronics, 1341 L St., NW

EXPORT: Ad. Auriema, New York; Canada: Hackbush Electronics, Toronto; Hawaii: Welton & Co., Honolulu

For more facts circle 477 on Reader Service Card

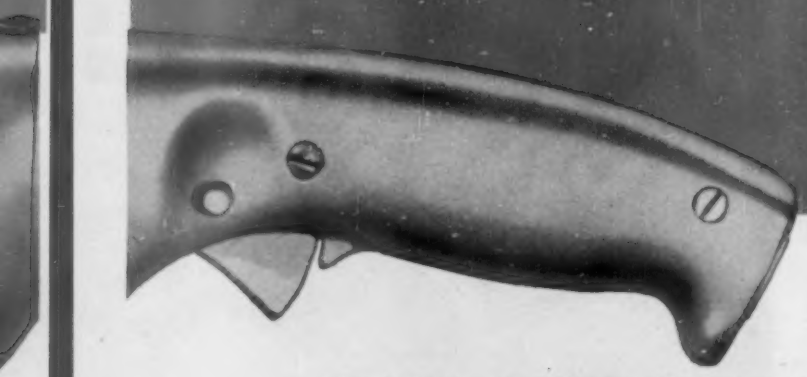
SKIL announces a big, new

DISC SANDER TRADE-IN

Backing pad extra

See your SKIL

money-saving SALE



your tired old disc sander is worth a whopping

$13

Here's the deal!

	PRICE
New SKIL Model 852 or 853	$98.00
Less Trade-in Credit	13.00
YOU PAY ONLY	**$85.00**

Now is the time to retire your old, worn out disc sanders. Stop pouring money into repairs—just bring your old sanders to your SKIL distributor and he will give you a full $13.00 each on your choice of the new SKIL Model 853 or the Model 852.

This is the hottest deal on top quality disc sanders—you can't match it anywhere. And it's doubtful if it can be repeated. It's truly a sensational offer—and it's good only until December 31, 1958.

We don't care the make or condition of your old disc sander—it's still worth $13.00 when you buy the powerful, long-lasting SKIL Disc Sander.

No wonder the SKIL Disc Sander is so popular for sanding, wire brushing and grinding!

- spindle lock on front of housing cuts disc changing time to seconds
- forced ventilation gives efficient cooling and dust protection
- new, higher spindle speeds for higher maintained speeds under load . . . cuts job time
- die-cast aluminum housings for greatest possible strength with minimum weight
- precision spiral bevel gears with rubber cushioned gear mounting for quiet operation and a minimum of wear

distributor today and get in on this trade-in sale

SKIL

Made only by SKIL Corporation, manufacturer of famous SKIL and SKILSAW products, 5033 Elston Avenue, Chicago 30, Illinois

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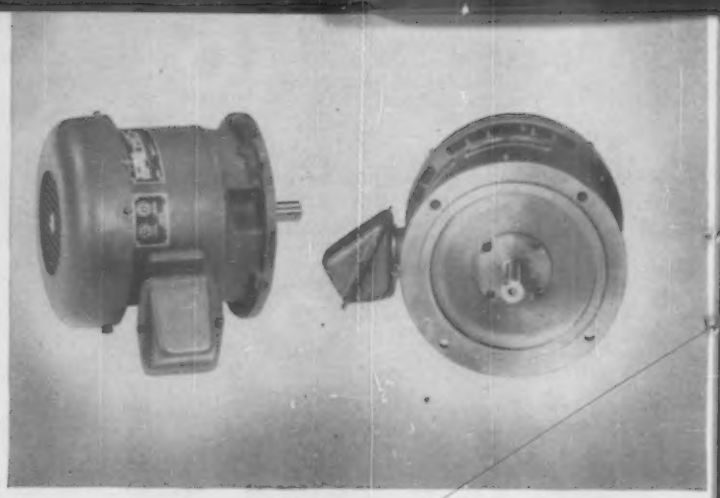

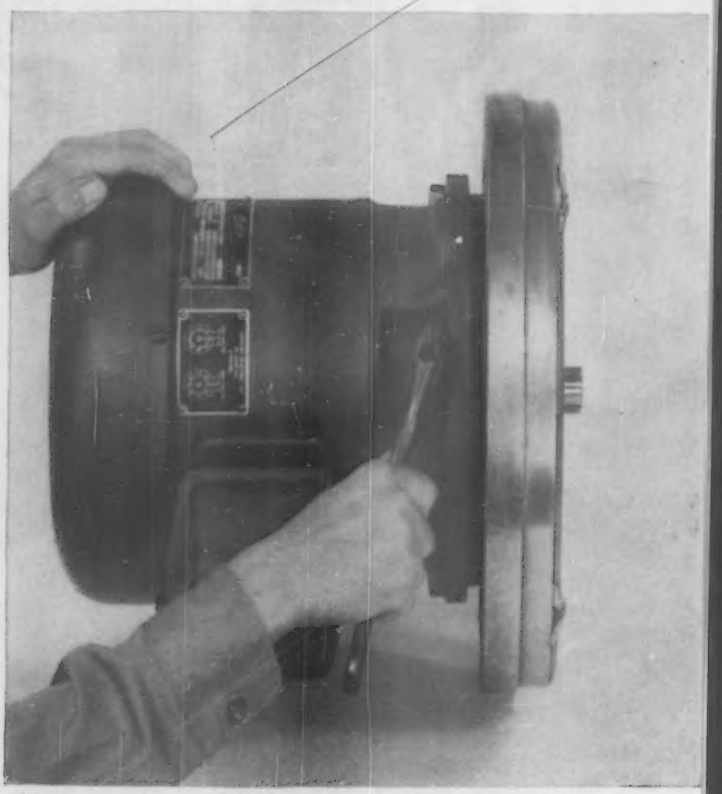

It's smaller. . . easy to mount . .

This is *not* simply a rerated motor. The Century Electric short motor is a standard motor available in ratings up to 15 hp, but . . . it has been redesigned to cut down length as much as four inches. It is designed to save space and weight for application on machine tools, roof ventilators, pumps, centrifuges and many other types of equipment.

Easy to mount: You can use this motor in place of any end-mounted motor because it has a standard flange. It can also be mounted horizontally, vertically or at any angle. Its small size means it can be mounted almost anywhere on equipment.

.lighter . . . *The Century Electric short motor*

Variety of applications: The short motor gives dependable performance on applications requiring frequent start-stop operation. You can get it in totally enclosed or open frames. And it has the same quality features and high standards of all of Century Electric's complete line—up to 400 hp.

More than a motor: This motor is the result of a continuing search for ways to meet industry's needs. Another reason why you get *more* than a motor from Century Electric.

For more details contact your nearest Century Electric Sales Office or Authorized Distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

DAY-BRITE CFI-10® (Comfort For Industry) fixtures, mounted 22 feet above the floor, furnish up to 40 foot-candles in this warehouse area at the GENERAL ELECTRIC APPLIANCE CO., Grand Rapids, Mich. HARLEY, ELLINGTON & DAY, Detroit, *Architects;* CLEMENT ELECTRIC CO., Grand Rapids, *Electrical Contractor.*

DAY-BRITE LIGHTING pays off for General Electric in these 3 ways

1. *In installation!* Day-Brite equipment is designed, factory pre-assembled and packaged to save hanging and wiring time on the job.
2. *In maintenance!* The cost of upkeep goes down with easy-to-relamp, easy-to-clean Day-Brite fixtures.
3. *In comfort lighting!* Nothing boosts worker efficiency and morale like Day-Brite lighting.

For information on how Day-Brite lighting can pay off for *you,* call your Day-Brite representative listed in the Yellow Pages.

DECIDEDLY BETTER
DAY-BRITE
LIGHTING FIXTURES

Day-Brite Lighting, Inc., 6240 N. Broadway, St. Louis 15, Mo.
Day-Brite Lighting, Inc., of Calif., 530 Martin Ave., Santa Clara, Calif.

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NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Hall Industrial Water Report

VOLUME 6 OCTOBER 1958 NUMBER 5

Drought Ends in Dry Southwest

Long-overdue rains have brought desperately needed water to the southwest mining industry. With water supply less critical, mine operators can breathe easier. But the abundance of water does not mean that they, or operators of any industry using water, can be less vigilant in treating the water for service, cooling, boilers, process or waste.

Hall Engineers are particularly helpful when water is at its worst. However, their services are just as important when more and better water is available. Even the best water usually requires treatment to avoid problems such as turbidity, scale, corrosion, foaming or biological slimes. Water can always cause trouble.

Softener Bypassed

The feedwater for a waste-heat boiler at a southwestern smelter is zeolite softened and then dealkalized by ion exchange. Tests showed the treated water to be normally soft and free of brining solution.

These apparently good conditions were belied by excessive phosphate consumption and by the presence of a lot of sludge in the boiler. Further testing revealed that the dealkalized water was almost one-half as hard as the raw water.

Together with the operating men, Hall Engineer J. F. Nelson made a thorough search for the source of the hardness. The "leak" was found to be an open valve in a bypass pipe around the zeolite softener. The valve had been opened when a temporary demand for water had exceeded the softener capacity and had not been closed.

With the valve closed, phosphate consumption dropped to its normal level. Nelson recommended installation of another zeolite softener so there will never be any need to open the valve in the bypass line.

Tailoring Water

A Pennsylvania manufacturer of mining tools operates electric induction furnaces cooled with well water high in temporary hardness and iron. The water also contains a lot of hydrogen sulfide—enough so that employees carried drinking water from their homes to avoid the bad taste and odor of the plant water.

Use of the poor quality water resulted in accumulation of deposits in the furnace cooling coils. The furnaces had to be shut down for cleaning about every second week.

When Hall Engineer D. C. Altenburger reviewed the situation with plant personnel he recommended the addition of Calgon® to the water at each well. Also chlorination of the mixed water to destroy the hydrogen sulfide.

Now, after several months, no cleaning of furnace coils has been necessary. The water no longer has an odor and employees can drink it at the fountains.

Boiler Damage Prevented

After trying unsuccessfully for three days to reestablish satisfactory boiler water conditions following a sudden large increase in dissolved solids and disappearance of phosphate and alkalinity, a Michigan salt refinery called on Hall Engineer C. H. Turner for help. On arriving at the plant he found that feedwater composition was normal but boiler water conditions were intolerable.

Turner's first acts were to open wide the continuous blowdown, arrange for hourly opening of main blowoff valves and start feeding large quantities of phosphate and caustic soda. Seven hours later, conditions were nearly back to normal.

The next move was to determine the source of the trouble. This wasn't easy because no one had noted anything out of the ordinary except the change in boiler water conditions. About 3:30 a.m., when almost everyone had gone home, Turner talked with the janitor, who knew nothing about the trouble but did furnish the vital clue. He recalled that the turbo-generator had been out of service for a short period a few days before. Turner reasoned from this that steam pressure on the salt pans had dropped low enough to permit gross contamination of condensate by inleakage of salt brine high in calcium chloride.

The steps taken prevented damage to the boiler so the only cost to the plant was the extra chemicals required. Profiting by this cheap warning, the plant has made changes to prevent a recurrence of the difficulty. Leaks in the salt pans have been repaired and devices have been installed to detect any further contamination of condensate.

Nitrogen Capping

Some standby boilers must be kept filled with water, ready for service. Chemical treatment protects the surfaces contacted by water. However, protecting superheaters and reheaters from corrosion is more difficult. The problem is being solved in some plants by maintaining nitrogen under slight pressure in all vapor spaces of idle boilers, superheaters and reheaters.

Nitrogen capping is also being used for standby protection of heaters, turbines, piping, pumps, etc. Surge tanks, receiver tanks and similar equipment can even be protected during operation. The essential features are: (1) an uninterrupted supply of nitrogen low in oxygen content; (2) nitrogen pressure held higher than atmospheric pressure; (3) routine checks to make sure there are no lapses in this control.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve *your* water problems, write, wire or call address below.

Water is your industry's most important raw material. Use it wisely.

HALL LABORATORIES
DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

BETTER AIR CONDITIONING FOR EVERYBODY EVERYWHERE

Carrier

Which is the best way to air condition a factory?

That depends on the factory. How big it is, what you manufacture and the number of employees you have can make a big difference.

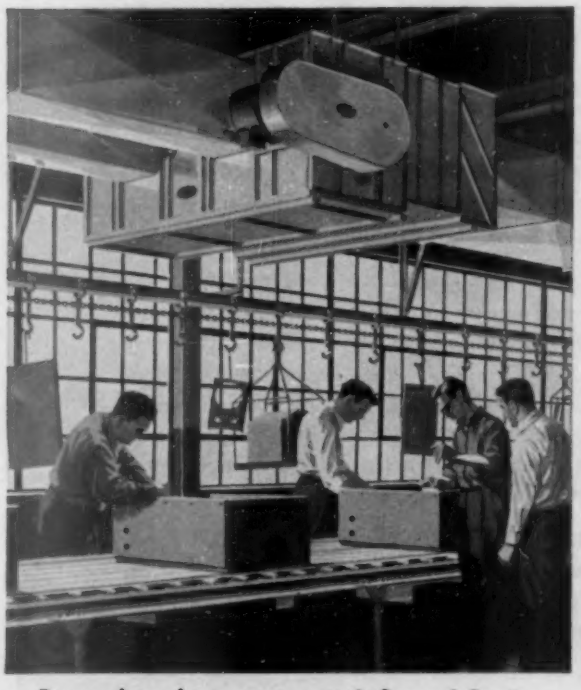
To make sure of the best way to air condition your factory, talk with the Carrier representative in your community. He handles every type of air conditioning. (Four of the many are described at the right.) So his only interest is to recommend the type that serves you best.

Throughout the world, in thousands of dependable installations, Carrier air conditioning serves more people and more purposes than any other make. Good reason to call the Carrier dealer or office listed in your Classified Telephone Directory. Carrier Corporation, Syracuse, New York.

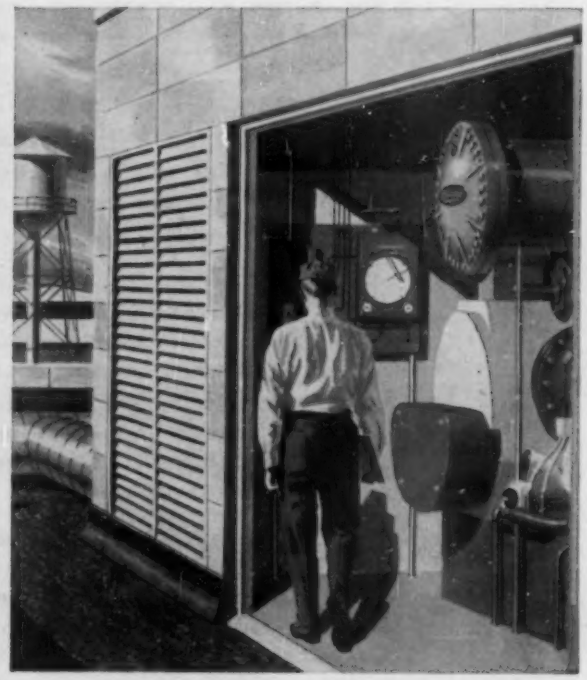
Ask your Carrier representative for copies of the free booklets, "Which Is the Best Way to Air Condition Your Plant?" and "Which Is the Best Way to Air Condition Your Business?" Or write to Carrier Corporation.

Do you have a small shop? Choose Carrier Weathermakers*. They are self-contained air conditioners which may be used with or without ducts. Quick and easy installation won't interrupt work.

Do you have a production line? Install a Carrier Commercial Weathermaker and run a duct from it along the full length of the line. You'll get cooling only where you need it, right where the work is done.



Do you have large open areas? Suspend Carrier System Weathermakers over each area and supply them with chilled water from a central source. You cool separated areas with no ductwork in between.



Do you have a large plant? A Carrier Spray-Coil Air Conditioner and matching Refrigerating Machine out of the way on the roof will deliver perfectly conditioned air to all parts of the factory below.

*Reg. U.S. Pat. Off.

Announcing the IBM 7070

DATA PROCESSING SYSTEM

• **First of IBM's line of fully transistorized data processing systems is the new IBM 7070—the most powerful and completely balanced system in the medium-scale computer field. It combines, for the first time in a solid-state system, higher storage capacity, faster computing speeds, new high-speed input-output units and a complete programming system.** ***In short, the IBM 7070 gives more performance per dollar than any system in its class.***

The SYSTEM: Transistor design lowers initial cost, minimizes cooling power and maintenance needs. "Building block" design grows as you grow. Other exciting features: IBM 7070 "reads," "writes," computes simultaneously; provides "automatic priority processing" for most economical use of system time. Ninety-nine built-in indexing words—more than in any other system—mean fewer operating instructions, faster, simpler programming. RAMAC® files provide immediate access to data.

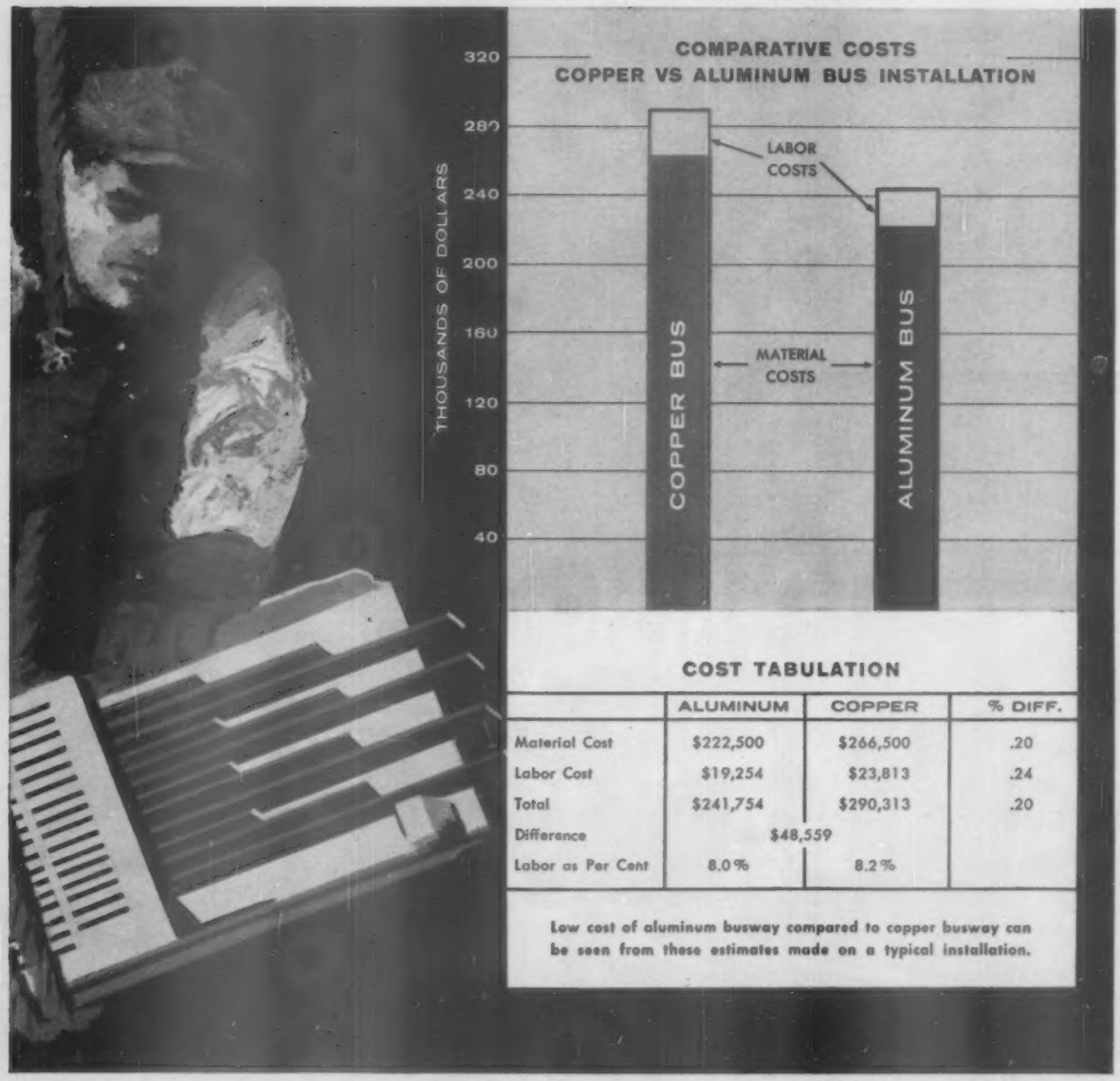
The SERVICE: Unmatched IBM systems know-how is part of every IBM 7070 "package." From education of your personnel to top-notch service engineering, from program planning to testing—IBM men and methods stand by you to assure profitable operation as fast as possible. In addition, with the IBM 7070 you will receive a library of advanced programs at no extra cost!

The SAVINGS: Major design breakthroughs make possible lower lease or purchase prices, lower operating costs. For example, the IBM 7070 will sort at least 30% more economically than other computers. And equally important are the savings you make through added efficiency and more complete management information with the IBM 7070.

For further information, call your local IBM representative. Ask for free booklet, "IBM 7070." Or write: International Business Machines Corporation, 590 Madison Avenue, New York 22, N. Y.

IBM DATA PROCESSING

For more facts Circle 483 on Reader Service Card



COST TABULATION

	ALUMINUM	COPPER	% DIFF.
Material Cost	$222,500	$266,500	.20
Labor Cost	$19,254	$23,813	.24
Total	$241,754	$290,313	.20
Difference	$48,559		
Labor as Per Cent	8.0%	8.2%	

Low cost of aluminum busway compared to copper busway can be seen from these estimates made on a typical installation.

ALUMINUM BUSWAY: TODAY'S BIGGEST BUILDING BARGAIN

Lower cost, flexibility, ease of installation spur trend to aluminum

More and more cost-conscious architects, engineers and building owners are insisting that aluminum busway be written into specifications. They've heard about the enormous savings you can expect with aluminum busway: up to 20 per cent on material cost, up to 20 per cent on installation cost and savings in weight, permitting the use of less costly busway supports. They know that aluminum busway will provide a neat, safe installation with the flexibility to meet new or added power demands.

Busway with lightweight Alcoa® Aluminum Bus Bar provides more power per pound of metal and has the same voltage drop and temperature characteristics as a comparable system. Pound for pound, aluminum busway has greater current-carrying capacity than cable in conduit. It also requires less space.

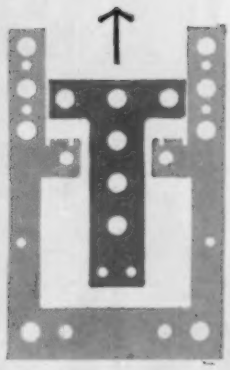
When you need a modern, flexible distribution system, specify busway made with Alcoa Aluminum . . . and *save*. Aluminum Company of America, 2296-K Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM
ELECTRICAL CONDUCTORS AND ACCESSORIES

Your Guide to the Best in Aluminum Value

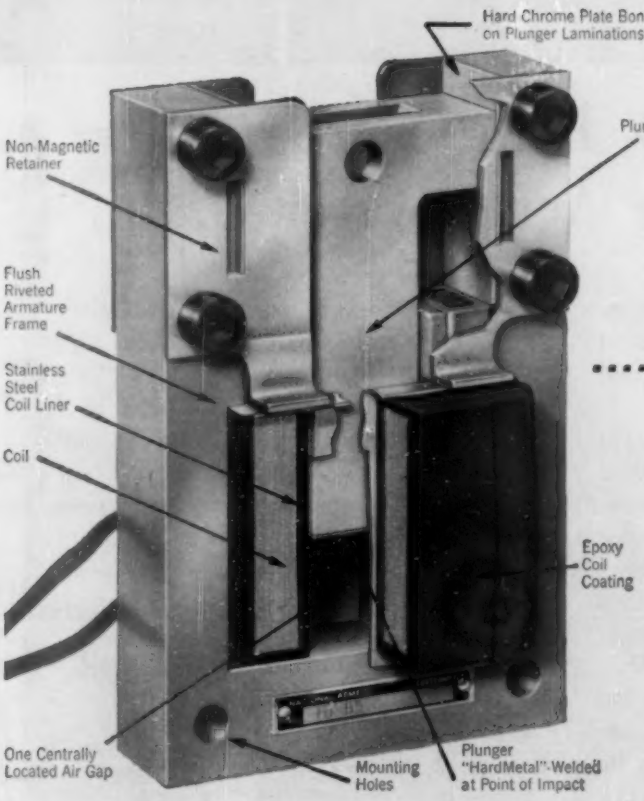
"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

SOLENOID CHATTER ELIMINATED.....



.....

with the NEW NAMCO "Hard Metal"-Welded Solenoid



.....so quiet in its closed position, so rugged, so adaptable to any design problem, your application headaches are reduced to mere details!

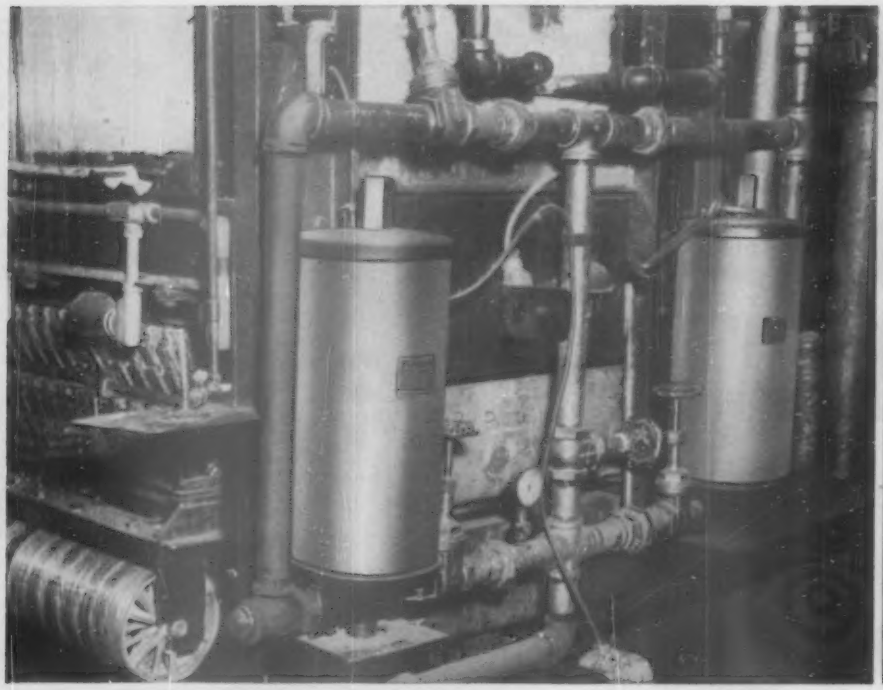
Its noiseless operation permits solenoid applications never before considered practical. The usual chatter and clatter in the closed position is eliminated by a unique design that provides a positive three-point contact in the "holding position." Add to this Namco's exclusive "hard metal"-welded plunger bonding that prevents mushrooming at the vital point of contact; hard chrome-plated upper guide edges of plunger laminations that reduce friction and wear; superior electromagnetic qualities, and the result is a *silent performer* you can't afford to overlook.

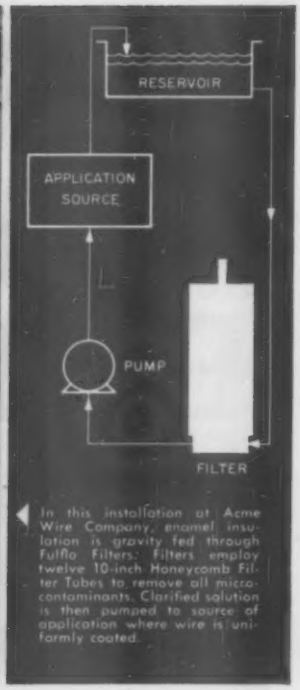
Namco standard solenoids are available in a wide range of pull and push types with capacities up to 25 lbs.; custom-engineered solenoids in every size capacity and type can be made to meet your specifications. Write us about *your* application problems stating specific requirements.

National Acme

THE NATIONAL ACME COMPANY
167 East 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.





In this installation at Acme Wire Company, enamel insulation is gravity fed through Fulflo Filters. Filters employ twelve 10-inch Honeycomb Filter Tubes to remove all micro-contaminants. Clarified solution is then pumped to source of application where wire is uniformly coated.

Fulflo Filters help insure quality of insulation for Acme Wire . . . . . .

Here's how Acme Wire Company of New Haven, Connecticut, uses Fulflo Filters to keep wire insulating compounds free from micro-contaminants.

Increasing demand for smaller armatures and coils has resulted in the development of magnet wire with exceedingly fine diameters. These call for even thinner coatings of insulation — which must meet higher and higher standards of protection. Such quality calls for absolute purity of insulating compounds. Fulflo Filters, with genuine Honeycomb Filter Tubes, remove all contaminants, such as fine copper dust, down to the incredibly small size of 1 micron. In this way, Acme assures its customers of uniform purity of insulation.

In addition to improving product quality, Fulflo Filters reduce downtime, prolong equipment life and increase production in a variety of operations. They provide any desired degree of micro-clarity for all types of industrial fluids: liquid chemicals; oils; water; liquid fuels; compressed air, CO_2 and other gases. Fulflo Filters give true *depth* (not just surface) filtration, at minimum pressure drop, for high or low flow rate, pressure, *p*H, temperature, and viscosity. Complete engineering facilities are at your service.

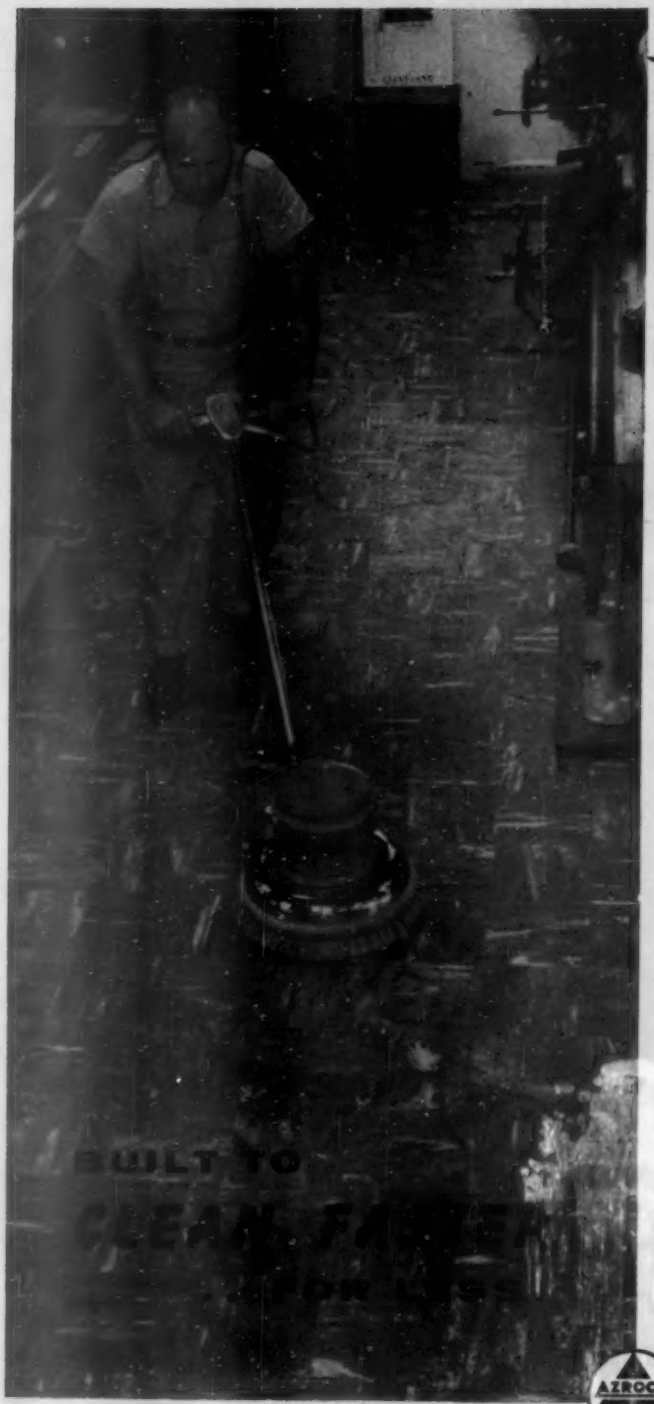
Write for new catalog to Department FA

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*



NEW

DURACO® VINYL INDUSTRIAL TILE

Is the cost of cleaning floors in your plant too high? Duraco, the new vinyl industrial tile, can help materially to cut these costs. Dirt and grime stay on the surface of this flooring—are removed easily with less effort.

This remarkable industrial flooring is built to do a better job in plant and factory areas. It's greaseproof and acid-resistant – easier and safer to walk and work on – and can take the abuse of in-plant trucking. It's the answer to lower floor costs per square foot per year in your plant. Get the facts –write today for Duraco samples and descriptive folders.

SPECIFICATIONS

Available in 5 terrazzo colors, 5 marbleized colors – coordinated with accepted industrial color standards. Size 9″ x 9″. Thicknesses: Standard Gauge 3/32″ – Heavy Gauge ⅛″.

AZROCK FLOOR PRODUCTS DIVISION

UVALDE ROCK ASPHALT CO.

FROST BANK BLDG. • SAN ANTONIO, TEXAS

AZROCK FLOOR PRODUCTS DIVISION

505 Frost Bank Bldg. San Antonio, Texas

Please send me Duraco samples and descriptive folders without obligation.

NAME_____

FIRM_____

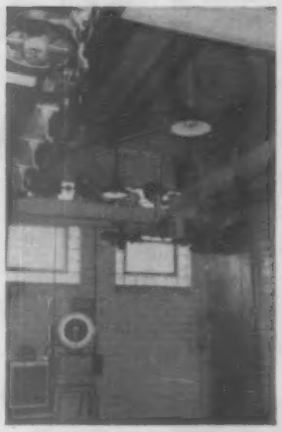
ADDRESS_____

CITY_____ STATE_____

For more facts circle 487 on Reader Service Card

LOOK TO TOLEDO for Progress in the World of Weighing

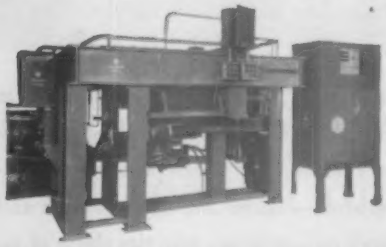
MULTI-SCAN FOR WEIGHING ITEMS IN MOTION



For items moving on overhead tracks (hog carcasses, for example) Toledo Multi-Scan system provides accurate average weights without necessity of bringing the swaying carcasses to rest. Weight data is fed into remotely located adding or other office machines for listing and totalizing of weights. Identifying data may also be introduced through key input stations.

AUTOMATIC BATCHING SYSTEMS

"Remocon" controls feature remote setting for fully automatic operation. Simple dial knob adjustments control quantities of each ingredient, allow precise duplication of batches. Extremely flexible — use with a single scale or multiple scale batching system.



PRODUCT TESTING AND CLASSIFYING

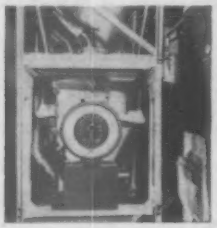
This custom-engineered Toledo automatically tests and classifies large coil springs. It is one of many types of Toledos used for classifying a wide range of items — from small packages to large cartons and production parts — in a variety of manufacturing operations.

Check These Specialized Jobs TOLEDOS Are Doing

When you have a problem in weighing, testing, counting, batching, sorting or weight data processing . . . and you want the practical, economical answer . . . it will pay you to check with Toledo. Toledo's complete line of industrial scales provides today's effective answer for a wide range of needs; or for special applications, Toledo Scale engineers will work with you on modifications or completely custom-engineered units. Toledo's huge reservoir of experience is your assurance of a practical, cost-saving solution. Let us help you. Write TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.

TOLEDO® HEADQUARTERS FOR WEIGHING SYSTEMS

AUTOMATIC BULK WEIGHING



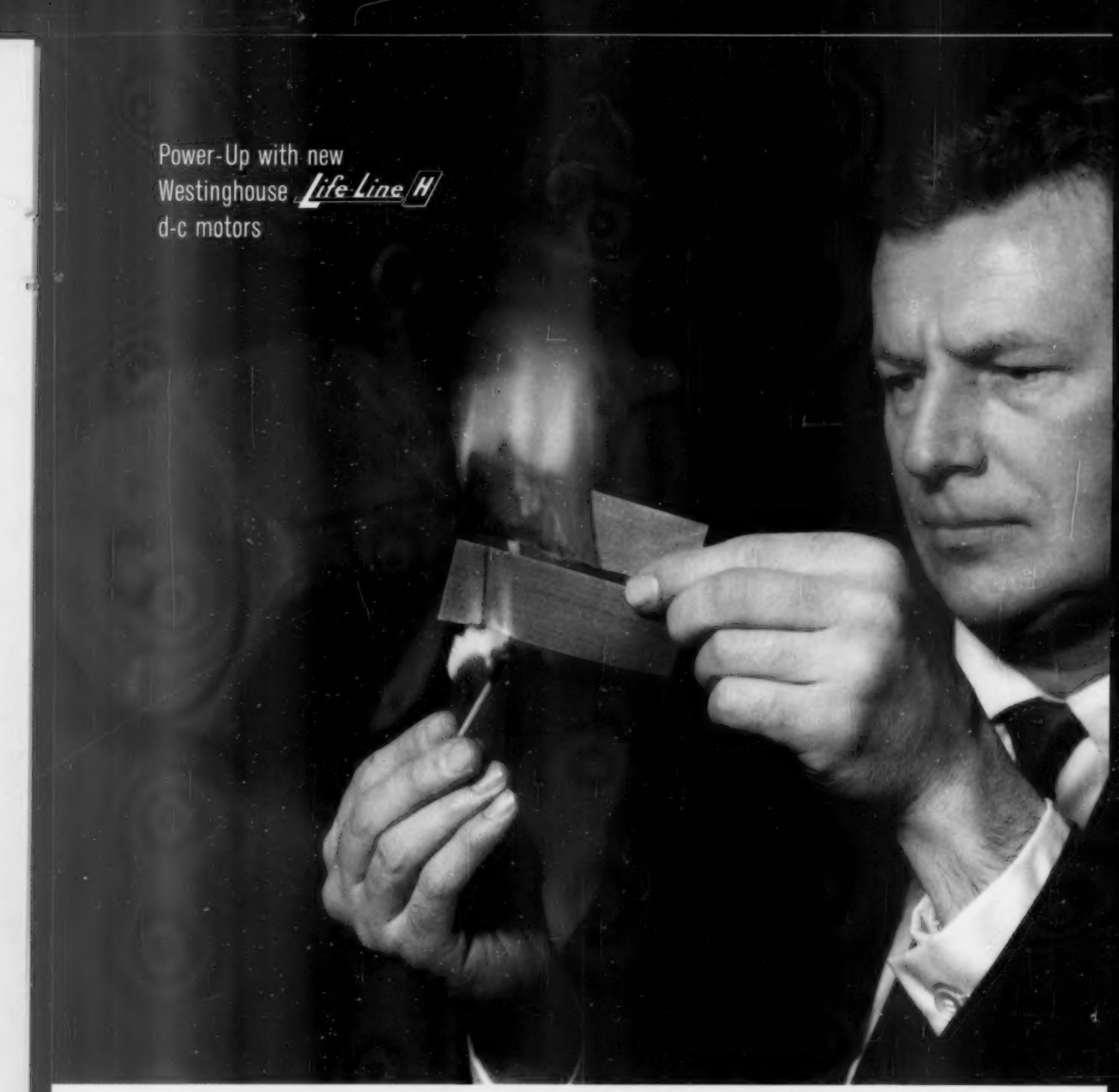
Toledos provide accurate, net weight listing and totals of bulk materials going into truck or carload shipments. Weighing is automatic. A Toledo weight-control console with automatic recording and totalizing unit may be remotely located for operating convenience.

ELECTRONIC AND HYDRONIC SCALES

Toledo Electronic Scale heads may be remotely located wherever convenient, because there are no mechanical connections. Toledo offers full electronic scales, also combinations with hydraulic or mechanical components to meet a wide range of requirements. For specific applications, digital indication of parts counts may be provided electronically.

For more facts circle 488 on Reader Service Card

For more facts circle 489 on Reader Service Card ➤



Ten times longer insulation life under any temperature conditions

HERE'S WHY: New silicone insulation in Westinghouse Life-Line* "H" d-c motors and generators stands up under temperatures which turn ordinary insulation to a cinder. High-temperature silicone insulation is used with the full complement of iron and copper required for low Class B temperature. Result: Life-Line "H" shrugs off emergency overloads and abnormal ambients to keep production rolling, maintenance down.

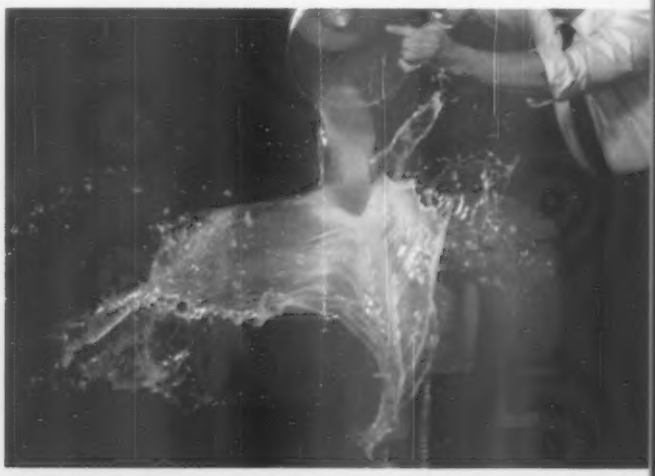
Plus . . . these other important advantages .....

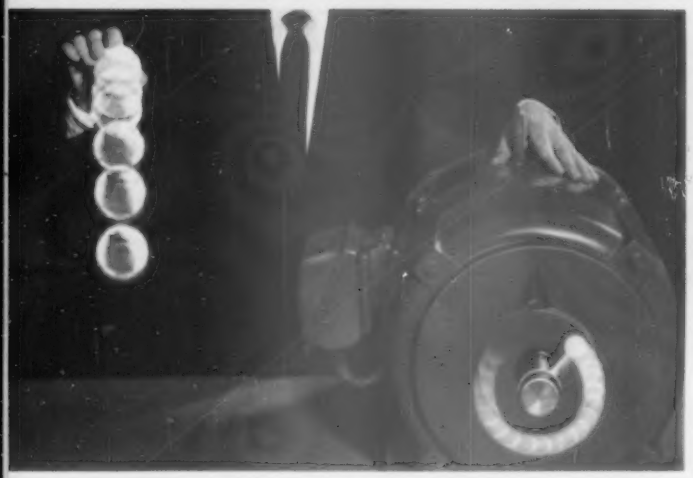
YOU CAN BE SURE...IF IT'S Westinghouse

These exclusive features of the new Westinghouse Life-Line H d-c motor guarantee top performance . . . longer, trouble-free life

CLEANER, COOLER OPERATION results from new controlled ventilation system of Life-Line "H." Ordinary d-c motors draw air in at commutator end, contaminate windings by drawing carbon dust from commutator brush wear *into* the machine. Life-Line "H" reverses this flow. Air and carbon dust are expelled at commutator end . . . assuring cleaner, cooler windings . . . longer motor life . . . less maintenance.

GREATER PROTECTION . . . most complete and advanced protection available in dripproof industrial d-c machines. Elimination of uncovered side openings . . . heavy, cast end brackets . . . effective seals throughout . . . all combine to provide outstanding resistance to liquids, vapors and dirt. This means longer life with greater reliability . . . minimum maintenance under all operating conditions.



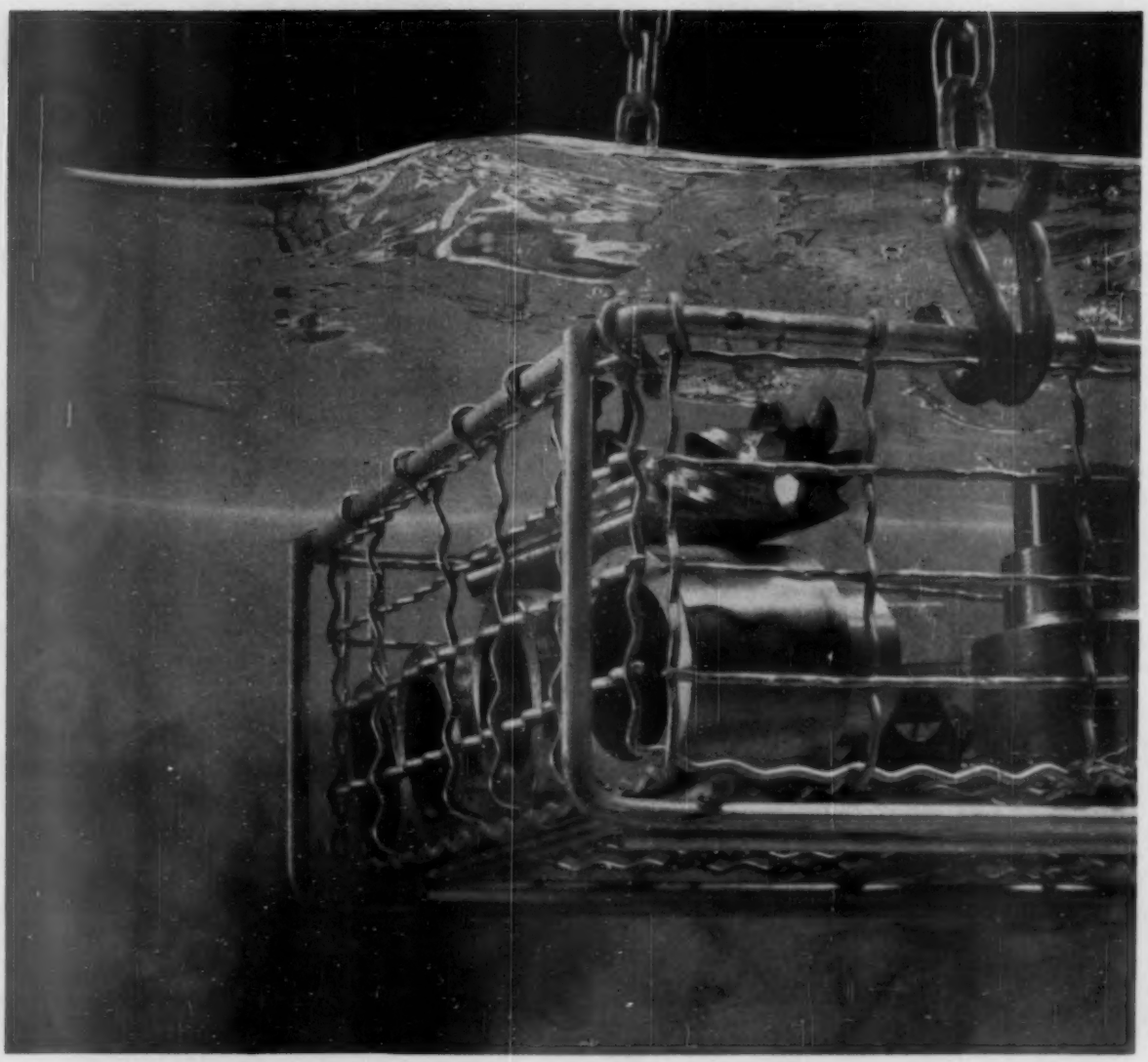


FASTEST RESPONSE . . . 35 per cent increase in commutating ability . . . up to 55 per cent lower mechanical inertia . . . and up to 30 per cent reduction in electrical inertia mean that the new Westinghouse Life-Line "H" d-c motor provides the fastest acceleration, quickest reversing and closest speed regulation. This means more production, better product quality, minimum complexity of control.

SIMPLIFIED MAINTENANCE . . . With the new Life-Line "H," maintenance is not only substantially reduced but periodic inspections are also greatly simplified. For example: as shown above, Uniforce brushholder fingers lock out . . . brushes can be inspected or changed with one hand. And Uniforce tension remains constant throughout brush life . . . no need to adjust pressure as brushes wear.

For information about the ways you can profitably put the new Life-Line "H" motor to work, contact your nearby Westinghouse representative. Or, write Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa. JI-22123

YOU CAN BE SURE... IF IT'S Westinghouse



For sure, safer cleaning—try Chlorothene

Superior solvent for production and maintenance cold cleaning

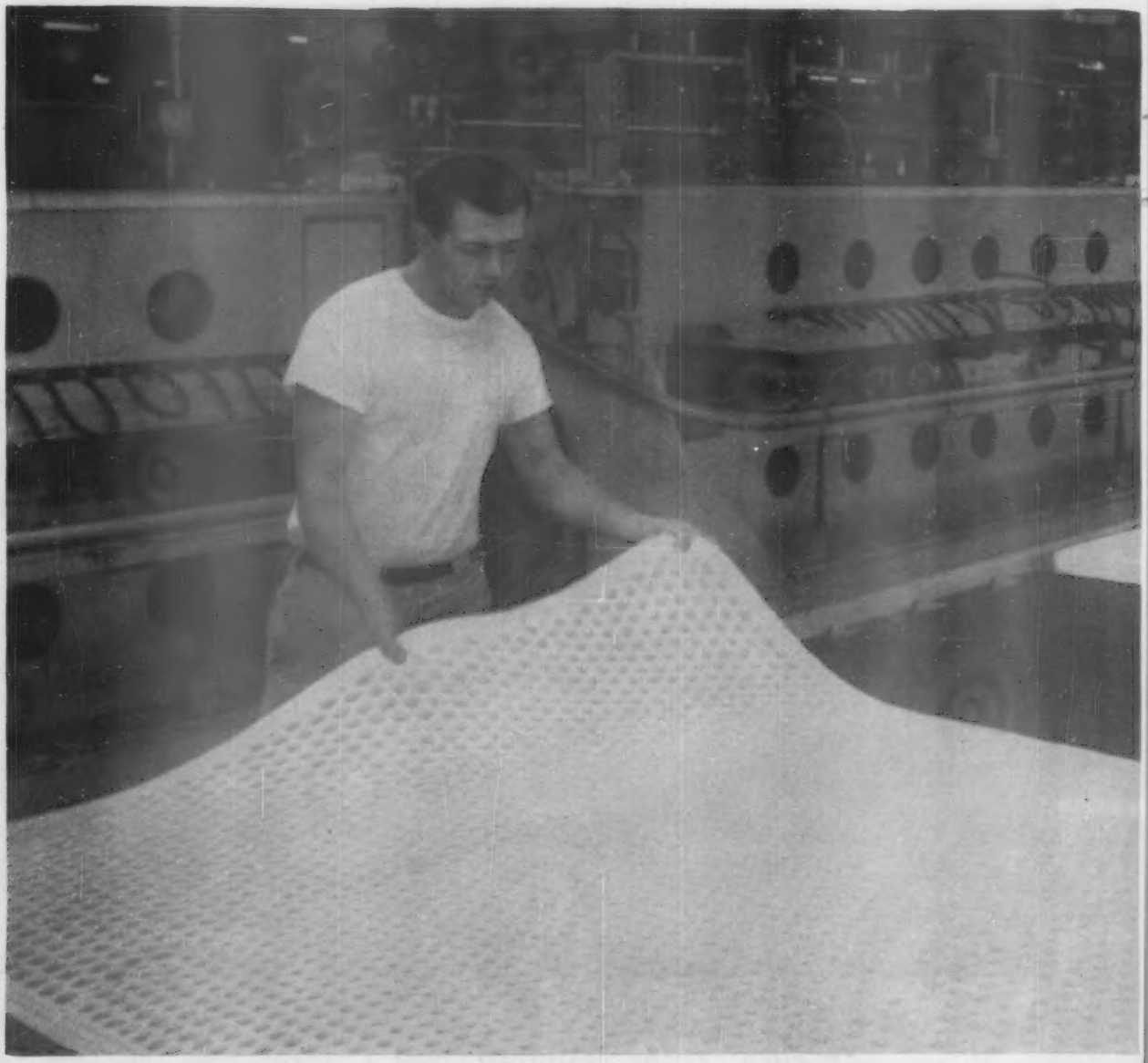
For any type of industrial job—dip, spray, wipe or bucket cleaning—your best bet is Chlorothene® (Dow 1,1,1-trichloroethane, inhibited). This unique Dow solvent removes grease, oil, lubricants and other contaminants quick as a wink, leaving metal parts and equipment with no oily residue.

Chlorothene does a topnotch job on many nonmetallic materials, too—makes cleaning easier, faster and more thorough. And with Chlorothene, you're operating on a new level of safety. Chlorothene, with flammability characteristics similar to trichloroethylene, has no flash or fire point. Its M.A.C. rating is 500 ppm.

If you aren't using Chlorothene already, there's no better time than right now to start. Try it on any production or maintenance cold cleaning operation in your plant. Contact your Dow solvents distributor—same source of supply for Dow Perchloroethylene Industrial, Dow Methylene Chloride, and Dow Trichloroethylene in two new types.

Write today for the Chlorothene book. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. SO 1151A.

YOU CAN DEPEND ON DOW



125 B. F. Goodrich presses, using Gulf Harmony Oil, mould

GULF MAKES THINGS

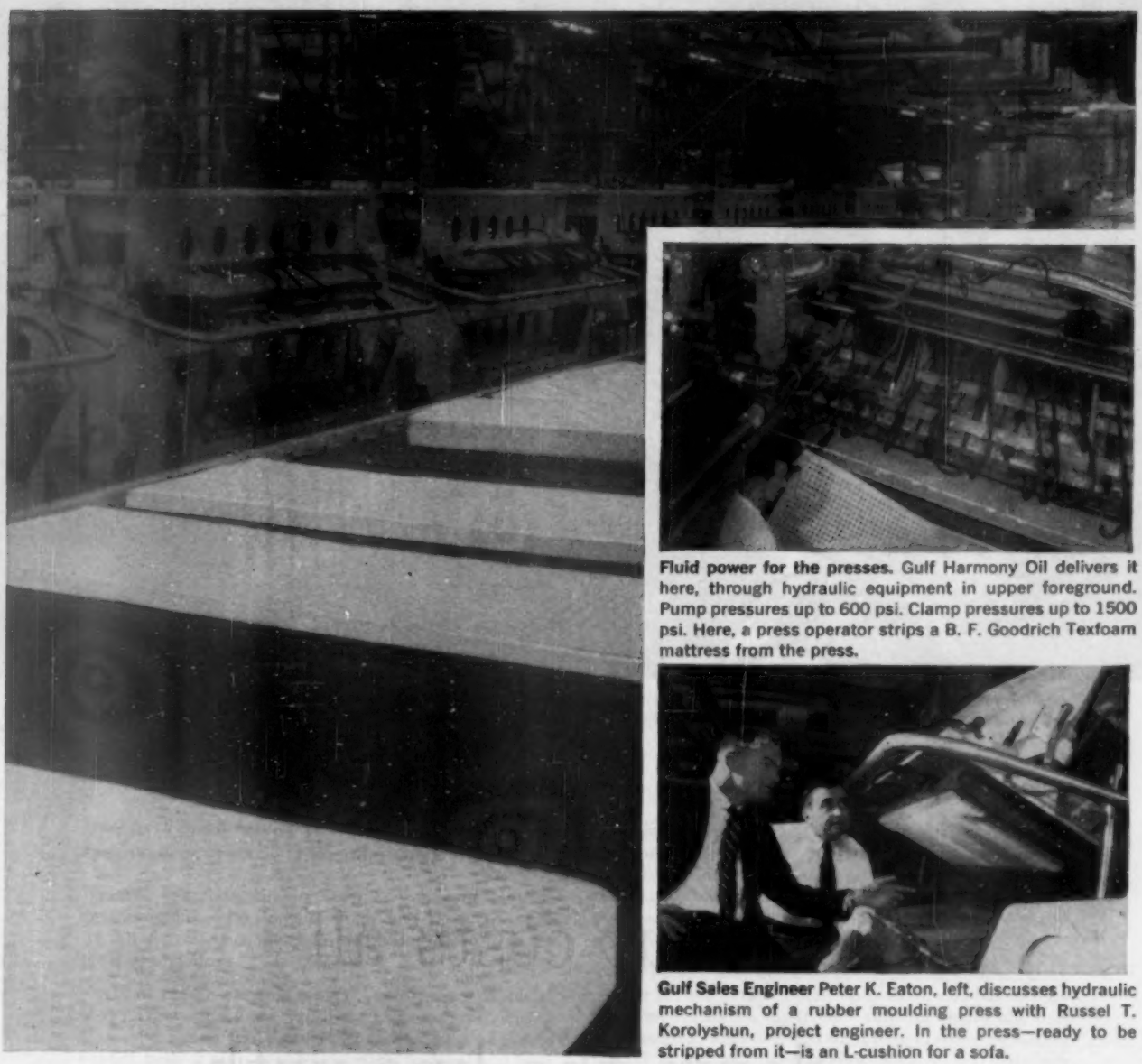
"We'd be up to our necks in expensive scrap if we used an inferior hydraulic oil," says Alex Sandomirsky, chief engineer at the B. F. Goodrich Sponge Products Division in Shelton, Connecticut.

The plant turns out highest quality B. F. Goodrich Texfoam mattresses, pillows, auto seat and furniture cushions around the clock. It has the world's largest installation of rubber moulding presses, 125 of them on one central, 700-gallon hydraulic system. The oil in this system *has* to be reliable, for if one press went out all would have to close down.

B. F. Goodrich uses Gulf Harmony Oil 53 as the power medium, serving these presses 24 hours a day, 6 days a week . . . tough service for any hydraulic oil. Gulf Harmony stands up perfectly in this operation, to the complete satisfaction of B. F. Goodrich. Production results are excellent.

Here's why Gulf Harmony Oil stands up so well, so long

New Gulf Harmony has outstanding oxidation resistance. It assures longer life, freedom from harmful sludge deposits. An anti-corrosion additive protects against rust. A patented anti-foam agent eliminates objection-



Fluid power for the presses. Gulf Harmony Oil delivers it here, through hydraulic equipment in upper foreground. Pump pressures up to 600 psi. Clamp pressures up to 1500 psi. Here, a press operator strips a B. F. Goodrich Texfoam mattress from the press.

Gulf Sales Engineer Peter K. Eaton, left, discusses hydraulic mechanism of a rubber moulding press with Russel T. Korolyshun, project engineer. In the press—ready to be stripped from it—is an L-cushion for a sofa.

foam rubber 24 hours a day . . .

RUN BETTER!

able foaming. Original viscosity and color stability are retained longer.

As a multi-purpose lubricant and hydraulic fluid, Gulf Harmony Oil is available in a full selection of grades to meet all your needs. It is ideal for hydraulic systems, air compressors, blowers, dryer-roll bearings, machine tools, electric motors, central circulating systems and a host of other applications.

Your Gulf Sales Engineer can show you how Gulf Harmony Oil can help you improve production and reduce maintenance costs. Just call your nearest Gulf office, or write for illustrated bulletin.

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

Without obligation on my part, send me illustrated bulletin on Gulf Harmony Oil.

Name_____

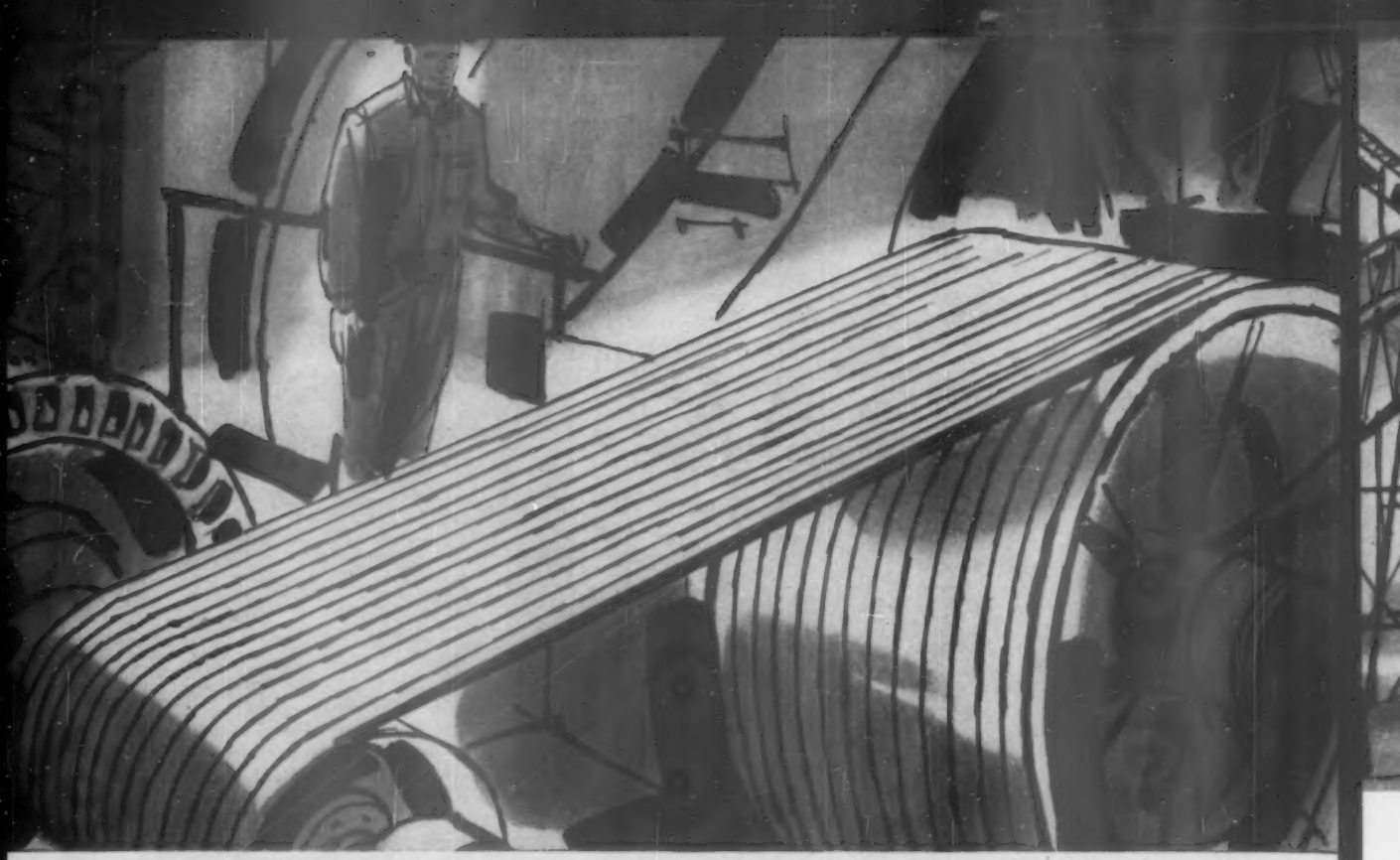
Title_____

Company_____

Address_____

City_____ Zone____ State_____

FMM-5212



Neoprene transmission belts keep power moving smoothly on all kinds of mechanical drive systems. They endure shock-loading, withstand high-speed flexing, and resist heat and oil. Result: they often outlast other belts 3 to 1.

You can cut costs all down the line with rubber products of neoprene or Hypalon®

Conveyor belts of neoprene keep rolling in spite of heat, fats, oils, grease. Outdoor exposure won't reduce their life expectancy. HYPALON is used for hot materials.

Neoprene steam hose stands up to high temperatures. Traces of oils and chemicals have negligible effect, won't cause rapid deterioration.

Acid hose gives longer service when it's lined with HYPALON for strong oxidizing chemicals or neoprene for most other chemicals. As covers, both resist wear and weather.

They give more service per dollar . . . they reduce maintenance costs . . . they minimize downtime

Whether it's transmission belts or conveyor belting, gaskets or hose, Du Pont neoprene and HYPALON offer job-fitted properties that mean extra durability in many plant applications.

Here are just a few typical performance records: V-belts that outlast ordinary belts 13 to 1 on circulating fans . . . cotton gin drive belts that outlast ordinary rubber belts 2 to 1 despite exposure to frictional heat and lubricating oil . . . in a steel casting plant neoprene conveyor belting carried molten sand and sharp metal fragments for one year without a shutdown; previous belts had lasted only 90 days . . . neoprene gaskets that resist sewage, salt water, severe compression on a municipal sewer line. An example of neoprene's versatility: general-purpose hose that can do the jobs of 4 separate special-purpose hoses to carry air, steam, oils, chemicals.

On-the-job results like these are typical of what you can expect from neoprene maintenance products. With its unmatched combination of properties, neoprene is capable of withstanding more deteriorating influences than any other rubber. After 23 years of outdoor exposure, for example, one sample of neoprene is still resilient, strong and crack-free. Neoprene also offers good all-around resistance to oil, grease, many chemicals, abrasion and flexing.

HYPALON, a newer Du Pont synthetic rubber, gives similar results under severe, specialized conditions. Its excellent resistance to strong oxidizing chemicals, oxidation-aging, abrasion and high temperatures is instrumental in the improved performance of hot materials belting and hose. In addition, HYPALON is completely ozone-proof.

The long-lasting performance of neoprene and HYPALON is available in many rubber maintenance products carried by your local rubber goods distributor. He can suggest the right product for your applications and offers quick delivery of small or large orders. Take advantage of his convenient services by calling him soon. For more information on the uses and properties of neoprene and HYPALON, write for *Du Pont Elastomers in Industry* to E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. FM-10, Wilmington 98, Del.

Du Pont synthetic rubbers do more things better . . .

NEOPRENE • HYPALON®

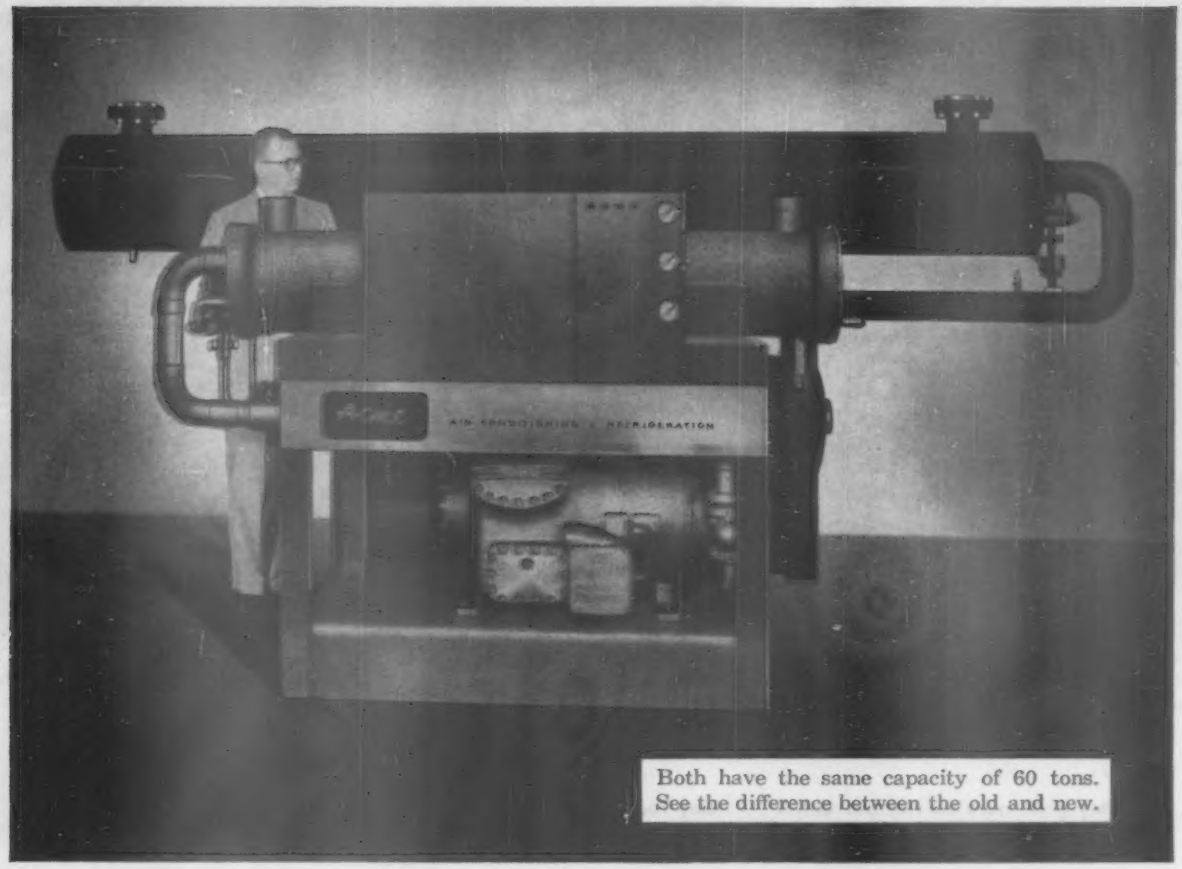
DU PONT

REG. U. S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

For more facts circle 492 on Reader Service Card

Acme . . . The **practical** approach to air conditioning



Both have the same capacity of 60 tons. See the difference between the old and new.

The Biggest News in Air Conditioning is 50% SMALLER

NEW Acme Water Chillers

- ★ Smaller—saves space
- ★ Lighter—easier to install
- ★ Lower cost—save money
- ★ Full line—23 models 3 to 125 tons
- ★ Famous Acme quality—built to last

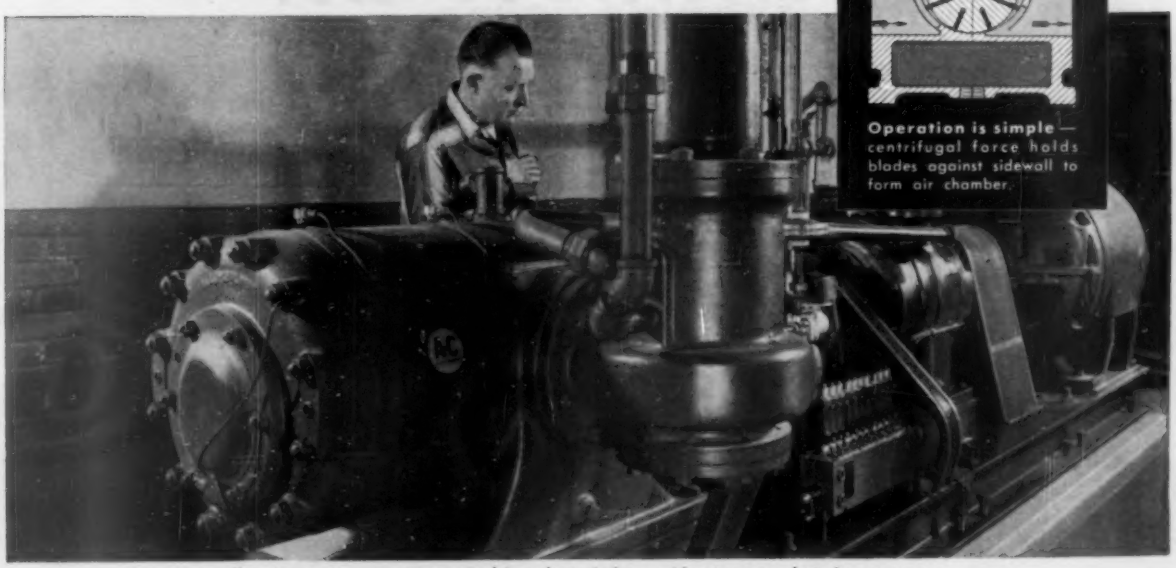
For details on this new line of Acme Water Chillers and how they can help you, call your nearby Acme Sales Engineer or write directly to the factory.

Acme INDUSTRIES, INC.
JACKSON, MICHIGAN

Manufacturers of quality air conditioning and refrigeration equipment since 1919.

Ro-Flo COMPRESSORS

Operation is simple—centrifugal force holds blades against sidewall to form air chamber.



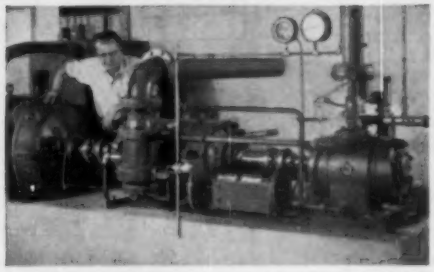
Two-stage rotary compressor supplying plant air for a midwestern manufacturing company.

No shake...no shimmy...no shock!

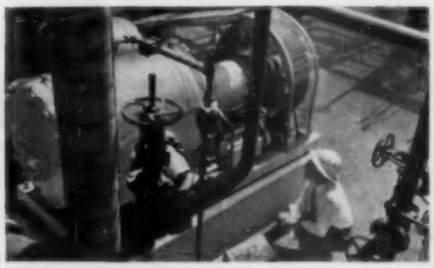
Rotary operation produces a remarkably stabilizing effect. You don't get the shimmy and shock inherent in reciprocating compressors.

Users in many industries have discovered that *Ro-Flo* compressors eliminate the cost of heavy foundations. A simple slab is enough. Smaller units are bolted directly to the floor. Automatic wear compensation at the rotor blades keeps compressor efficiency at high level even after years of use. There are only two wearing parts.

Ratings—Choose from twelve sizes of two-stage *Ro-Flo* compressors, ranging from 250 to 1800 cfm at pressures from 60 to 125 pounds gauge. Single-stage *Ro-Flo* units handle pressures up to 50 pounds gauge, and handle volumes from 40 to 3000 cfm.



Two-stage rotary compressor used for plant air service in a midwestern plant.



Ro-Flo hydrogen compressor in a southwestern plant, used here in conjunction with acrylic monomer process.

For complete information on Allis-Chalmers rotary compressors, ask for two-stage Bulletin 16B8244 or single-stage Bulletin 16B8126. Call your nearby A-C office or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.

Ro-Flo is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5713

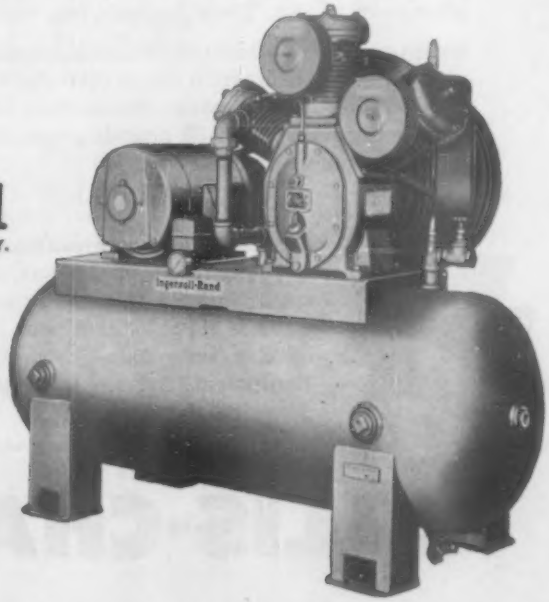
dependable air can reduce your production costs...

Ingersoll-Rand *air compressors*

TODAY'S COST-CONSCIOUS PRODUCTION MEN are specifying Ingersoll-Rand Type 30 Air Compressors because no other compressor presents the same combination of features designed for economical, efficient operation.

Time-tested I-R engineering assures outstanding performance in every type of installation, reflecting the experience of more than 80 years. Like no other compressor, the Ingersoll-Rand Type 30 gives you year after year dependability with unmatched efficiency that delivers more air per horsepower.

Complete details are available directly from Ingersoll-Rand Company or your local Ingersoll-Rand Distributor.



Ingersoll-Rand
11 Broadway, New York 4, N. Y.

Packaged air-cooled air compressors, ½ through 20 hp. other compressors to 6000 hp.

3-807

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For more facts circle 496 on Reader Service Card ➤

The Ludlow Line Protects Your Products Better

This tape's built-in activator saves shippers time, money

Wetting agents *used* to be a problem. They were costly, messy, unreliable and a nuisance to prepare.

Ludlow's Comet Tape has solved this problem with a wetting agent that never fails built right into its trade-mark. As the tape passes over the brush, the Comet trade-mark activates the glue, assuring fast, effective sealing with a minimum of pressure. This exclusive Ludlow feature is available with both Comet Snake Tape* (reinforced) and Comet superstandard kraft gummed tape.

Comet Tape is typical of Ludlow's job-tailored packaging products. Look to Ludlow for greater protection, lower costs and faster packaging. We'll consider it a privilege to serve you.

*Rule 41 — approved for center-strip sealing.

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PAPERS, INC.
NEEDHAM HEIGHTS 94, MASS.

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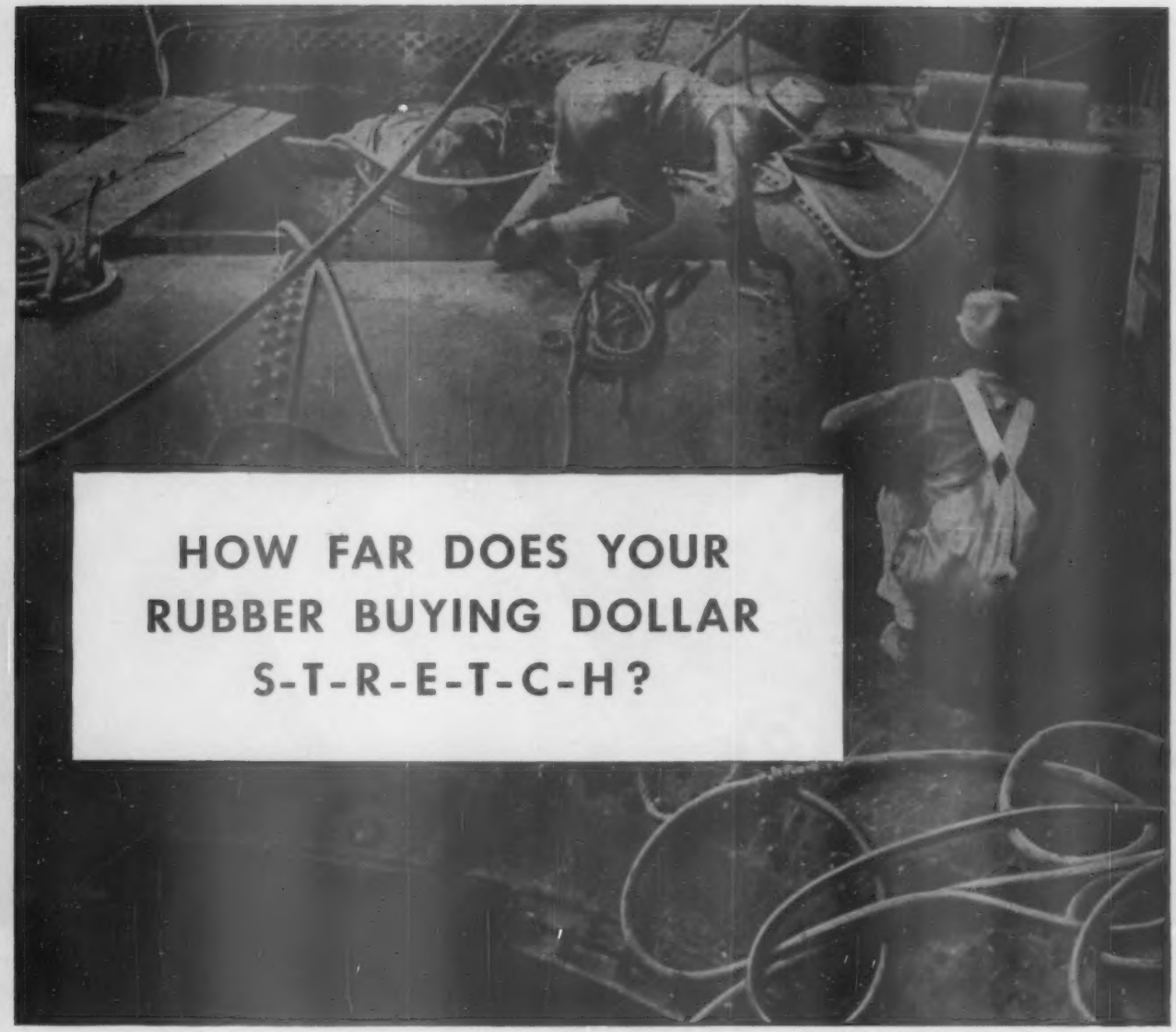
VPI-COATED PAPERS • GREASEPROOF PAPERS • WATERPROOF PAPERS • POLY-COATED PAPERS • GUMMED TAPES • FEDERAL SPEC. PAPERS • LABEL & SPECIALTY PAPERS • PLASTICS



Cost-Saving Features of R/M Allflex Hose Give You

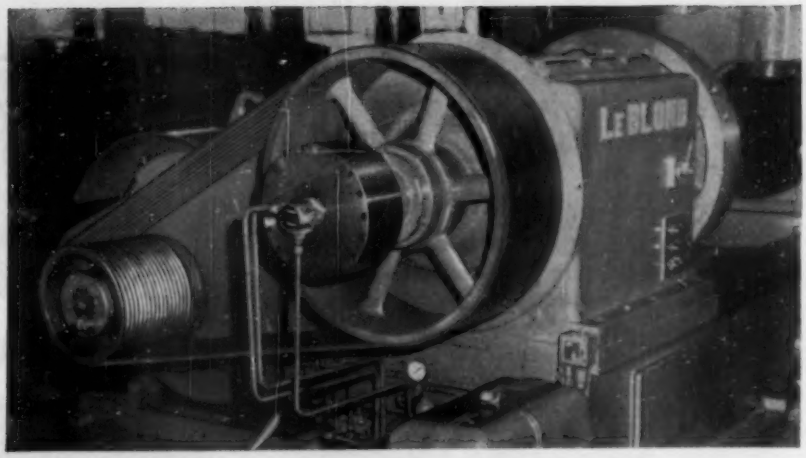
..."More Use ~~per~~ *for your* Dollar"

Allflex is the first hose of its type made for all-purpose use with air, water, oil, gases—even mild chemicals. Strong, light, flexible as a rope, and kinkless . . . Allflex coils and uncoils freely in *any* direction for easier handling on any *job*. Exclusive long life features of Allflex Hose permit cost savings never before possible with popular-priced all-purpose industrial hose.

- **Mandrel-Made**—No Pre-Set Twist, Extremely Flexible
- Resists Kinking—Eliminates Undue Internal Strain
- Inseparable Tube-to-Cover Bond—Increases Hose Life
- Uniform Inside and Outside Diameters—Easier Coupling
- Light, Easy to Handle—Increases Production

Let an R/M representative show you how Allflex Hose will do a *better* job and *last longer* for your uses. Write for Bulletin #7075.

For more facts Circle Reader Service Card Numbers



POLY-V®* DRIVE—This new Poly-V patented drive delivers up to 50% more power in the same space as a conventional multiple V-drive . . . or equal power in as little as ⅓ the space! Single unit belt permits narrow sheaves, less shaft overhang, less drive weight. Eliminates multiple V-belt "length matching" problems. More constant speed ratios, smoother running, longer drive life. Write for Bulletin # 6638.

*Poly-V is a registered Raybestos-Manhattan trademark.

RAY-MAN CONVEYOR BELT—Double compensation relieves stress of outer plies, assures longer life and lower costs for handling bulk materials. High fastener holding ability. Types available for heat, oil, static resistant uses; also for package and table-top installations. Investigate the wide selection of R/M Conveyor Belts. Write for bulletins.

• Coils and Uncoils Freely in Any Direction, Resists Kinking
• Inseparable Cover, Strength Member and Tube
• Balanced Homogeneous Construction Throughout, Very Flexible

BELTS • HOSE • ROLL COVERINGS • TANK LININGS • INDUSTRIAL RUBBER SPECIALTIES

R/M

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products: Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

605 Hose, 606 Poly V-Drives, 607 Conveyor Belt

When you buy Motor Starters——

YOU PAY FOR OVERLOAD PROTECTION

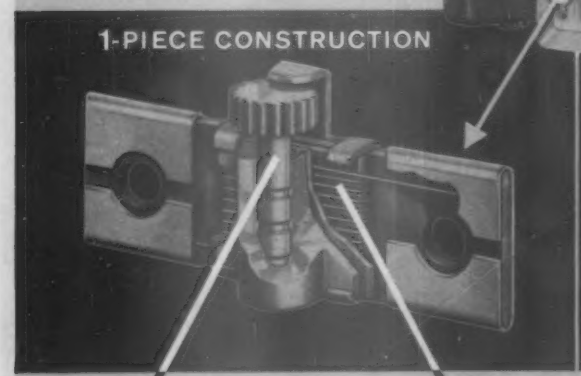
Only ONE-PIECE Overload Relays give 100% Protection • Only with ONE-PIECE construction can you *know* you've installed the heater correctly. Only with ONE-PIECE construction can you *know* the heater is exactly centered, or properly positioned, so that it performs according to its rating. Only with ONE-PIECE construction can you *know* your motors have full protection.

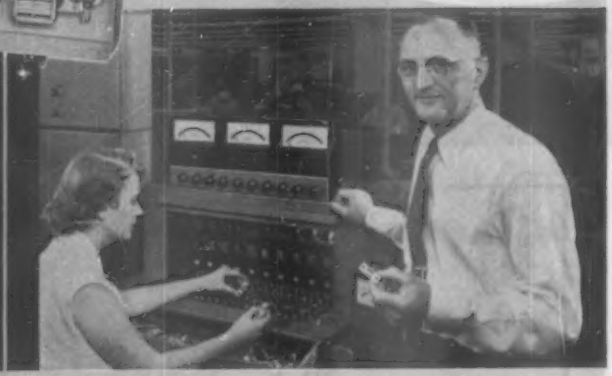
Only Square D has ONE-PIECE Construction • ONE-PIECE construction *eliminates* any possibility of heater misalignment. Square D melting alloy thermal overload relays can be installed only one way. They are tamper-proof. They are factory-assembled, are *individually* calibrated and tested. Repeated tripping will not affect accuracy.

Insist on Square D melting alloy thermal overload relays

***Write** for Bulletin SM-275 for the complete story on Square D starters with ONE-PIECE thermal overload relays. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin.*

...BE SURE YOU GET IT!





Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

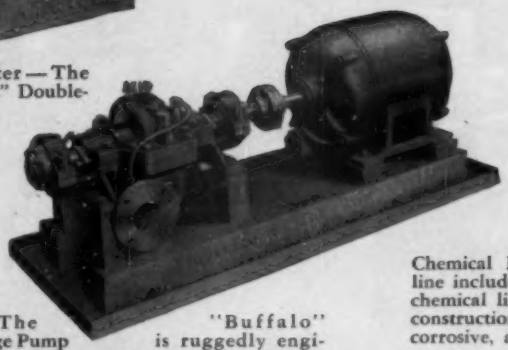
Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

Individual factory inspection of every Square D melting alloy thermal overload relay means performance you can trust. Each unit is calibrated and thoroughly tested to make sure it will perform according to its rating.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

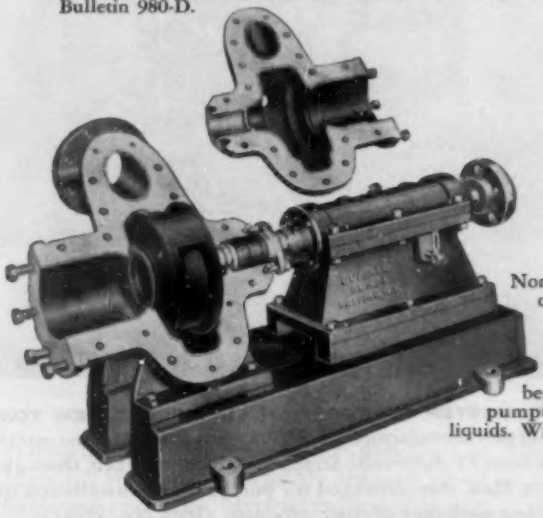
SQUARE D COMPANY

Clear Water — The "Buffalo" Type "SL" Double-Suction Pump is recognized for its highly efficient clear water service throughout industry. Capacities from 10 to 14,000 gpm. Write for Bulletin 955-R.



High Pressure — The "Buffalo" Type "RR" Multi-Stage Pump is ruggedly engineered to deliver peak efficiency on boiler feed and other clear water applications against heads as high as 1500 feet. Capacities range up to 900 gpm. For full details write for Bulletin 980-D.

Chemical Liquids — The complete "Buffalo" line includes ten specially designed pumps for chemical liquids. Available in several types of construction for handling a wide variety of corrosive, abrasive or high-consistency liquids. Write for Bulletin 982-A today.



Non-Clogging — "Buffalo" Diagonally Split-Shell Pumps are designed for moving high-consistency liquids, with down-time reduced to an absolute minimum. A number of models are available for pumping abrasive and corrosive liquids. Write for Bulletin 953-K.

WHATEVER YOUR LIQUID-MOVING PROBLEM, THERE'S PROBABLY A "BUFFALO" PUMP TO SOLVE IT!

And the fact that "Buffalo" builds a *complete line* of pumps — a type, size and capacity to fit almost every liquid-moving need — can save you money right from the start. It means you never need to pay for "more pump" than you actually require.

You'll find a "Buffalo" Pump to match your exact requirements, with complete assurance of the utmost efficiency, dependability, ease of maintenance and long-range economy. Just contact your nearest "Buffalo" engineering representative, or write us direct. We'll be glad to recommend the pump that's best-suited to your needs.

THE COMPLETE "BUFFALO" LINE ALSO INCLUDES: Heat Transfer Pumps, Close-Coupled Pumps, Sump Pumps and Raw Sewage Pumps. Special alloys available in all models.

Engineered into every "Buffalo" Pump is the famous "Q" Factor — the built-in QUALITY which provides trouble-free satisfaction and long life.

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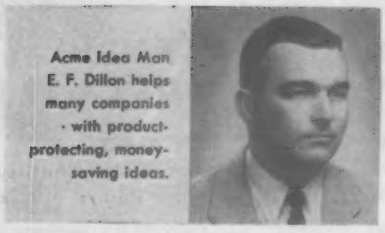
A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

Call your AIM*... Channel Master does...

Strapping machine reduces man-hours 75% to 80%



Acme Idea Man E. F. Dillon helps many companies with product-protecting, money-saving ideas.

CHANNEL MASTER CORPORATION, ELLENVILLE, NEW YORK, world's largest manufacturer of TV antennas, saw a demonstration of the Acme Steel F1 Automatic Strapping Machine. Then, through their Acme Idea Man, they arranged for purchase and installation of an F1 for bundling packages of their products. (Idea No. S2-22).

Now one man does the complete strapping operation. This has cut strapping man-hours 75% to 80%, and allowed the F1 to pay for itself very quickly. In addition, the F1 has improved the quality of the bundling. The F1 automatically tightens the strap to a pre-determined, uniform tension every time. Then the push of a button spot welds the strap and cuts it without waste. The result: tight, secure bundles every time, with only 1/5 of the man-hours!

***Call your Acme Idea Man** for complete information on how Acme Idea Methods and Materials can save you a good deal of money, combined with superior product protection. Or write Dept. FAS-108, Acme Steel Products Division, Acme Steel Company, Chicago 27, Ill. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ont.

ACME STEEL **STEEL STRAPPING**

17 Selected Areas Heated to 1650° F. in...

Just 10 Seconds

with TOCCO* *Induction Hardening*

A leading automobile manufacturer uses TOCCO Induction Heating for the tough, precision job of hardening camshafts. Material is high alloy cast iron. Minimum hardness obtained is 57 Rockwell C. Heating time is just 10 seconds per shaft. Production is 360 camshafts per hour. Take a look at these advantages:

1. TOCCO's localized heating means a minimum of distortion—far less than if the entire shaft were heated by other methods.
2. Obviously, the power cost is less than if the entire camshaft were heated.
3. TOCCO's automated process, with precise control, permits far less inspection than conventional methods—far fewer rejects.
4. TOCCO is cleaner and cooler, provides much better working conditions.

Even though you don't manufacture camshafts, look to TOCCO for your tough metal-heating jobs. Hardening, annealing, brazing, soldering, melting, heating for forging or forming—all can be done better, faster and at lower cost with modern, automatic TOCCO Induction Heating.

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Steel right off the truck—ready for your production line . . . your steel supply can be that simple when you rely on Ryerson. You order only the kind and quantity of steel you need—*as you need it*—and cut costs all along the line.

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FACTORY
MANAGEMENT AND MAINTENANCE
. . . PRESS TIME REPORT • OCTOBER 1958

Looking Ahead in Business

Business will end the year with a bang—not with a whimper, as it did in '57. Production, employment, and incomes are moving up strong already.

The brightest change is in capital spending. Latest SEC-Commerce reports show outlays for new plant and equipment reached a low in the second quarter, are now leveling out, will inch up in the next few months. Expenditures in '58 will still be down some 16% from '57—but the turn has come a good six months before it was expected.

•

New orders for machinery and industrial contracts give a clue to what's happening (table). Orders have rebounded, contracts are still weak. This means the pick-up is in equipment only, with most investment dollars going into cost-cutting machines and modernization. Plant construction (new capacity) is still in the doldrums.

Pressure for installing new capacity probably won't come until production reaches its pre-recession peak. Right now all manufacturing is running about 75% of capacity—against 70% at the low point of last spring's recession. As soon as the rate moves up over 80%, industry should start taking some of its deferred plans off the shelf.

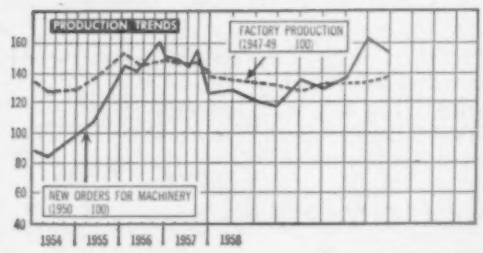
•

Business prospects for '59? Business will be better. How much better depends greatly on autos and housing. It's still too early to call all the shots.

Detroit is now talking about 5.5-million cars for '59. That's better than the 4.3-million in '57—but well below the record 7.9-million in '55. Actually, there's potential for 6-million cars in '59. Incomes will be rising and a big chunk of auto credit has been paid off.

Trouble is, Detroit will be trying to sell warmed-over versions of this year's big, chrome-heavy, high-finned models. The shift in public taste—especially in the second-car market—seems to be toward a smaller, more economical car. As one critic put it: "It's ridiculous to use a 4000-lb. car with 300 horses to carry a 100-lb. woman 100 yards just so she can buy a few hairpins."

FACTORY FIGURES OF THE MONTH



Indicator	Aug. 1958	July 1958	Aug. 1957
New Orders for Machinery (exc. elec.)[1]	154.0	163.0	146.0
Contracts for Industrial Construction[2]	73.0	89.0[r]	140.0
Factory Production[3]	139.0[p]	137.0	147.0
Consumers' Prices (cost of living)[4]	123.8[e]	123.9	121.0
Industrial Prices (materials, supplies)[4]	126.1	125.6	126.0
Manufacturing Employment (millions)[4]	15.5	15.2	16.9
Total Employment (millions)[5]	65.4	65.2	66.4
Unemployment (millions)[5]	4.7	5.3	2.6

[p] = preliminary [r] = revised [e] = estimate

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of the Census.

But the soonest the Big Three can switch to smaller cars is 1960. And with high costs and prices, Detroit will still have trouble meeting competition from foreign cars and other consumer goods. That's why some people today bluntly call Detroit sick. It's also why wage settlements in the auto industry last month were modest.

•

Housing is much better off than autos. In fact, with the recent boom, starts will wind up well over 1.1-million for '58. This is the first real surge in homebuilding in over three years.

Homebuilding should keep moving up well into '59. But most of the recent gains resulted from the Emergency Housing Act, which is now short of funds. And the FRB will be tightening credit, which could hurt financing next year. The housing market will also be bucking a declining rate of family formation over the next few years.

Ideas of the Month

(For more information, circle item numbers on Reader Service Card next to back cover)

Humdinger's the word for a coffee-break wagon (*Cres-Cor*). "Pick & Pay" has angled shelves for displaying merchandise. Also two flat working areas at each end for positioning coffee urn, cream dispenser, etc. **(314)**

Group Relamping is a new 16-page booklet (*General Electric*) guaranteed to convince you that it doesn't pay to replace one lamp at a time. Points out that burning a lamp after it has reached the end of its useful life is paying for electric power that is not being converted into light. **(315)**

First of its kind, Driver-Drill (*Miller Falls Co.*) combines features of high-torque, positive-drive screwdriver and rugged ⅜-in. drill. **(316)**

The Atom Comes to Town is a 16mm sound film in color (*Chamber of Commerce of the U. S.*). Designed for better understanding of the peacetime atom. Emphasizes industry's role. Time, 29 min. **(317)**

Chartmakers, layout men, engineers will welcome a 32-page booklet (*Chart-Pak*) that illustrates 425 pressure-sensitive tapes for making graphs, layouts, printed-circuit drawings. Directions for layouts, flow charts, etc. **(318)**

Dustless sanding? Sure. New 3-in. heavy-duty belt sander (*Black & Decker*) attaches to any standard vacuum cleaner to eliminate 90% of all dust and fine metal powder. Extra dividend: longer belt life. **(319)**

Accident Facts, 1958 edition, now ready (*National Safety Council*). Its 96 pages contain not only useful facts and figures, but also ideas for making speeches, writing articles, planning safety campaigns. **(320)**

Configuration chart (*Arrow-Hart & Hegeman*) will simplify identification, selection, and ordering of plug caps and electrical receptacles for specific amperage and voltage requirements. Wall and catalog-page sizes. **(321)**

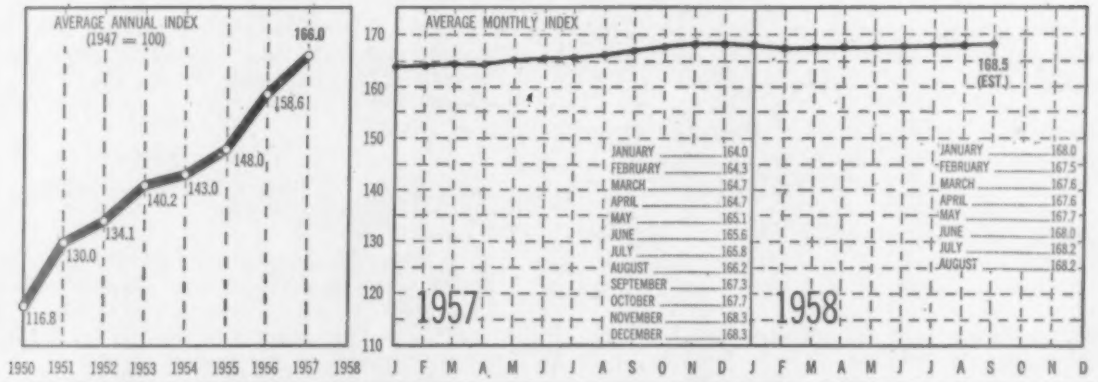
For loads better handled by hook than by fork, there's Aero-Crane (*Vanguard*). This counterbalanced mobile floor crane has a 10-ft-high reach, can pick up a load up to 6 ft. beyond front wheels of the truck. **(322)**

Thermopapers and Thermotubes are now available (*Paper Thermometer Co.*) for 100, 105, and 110 F. They measure temperatures by exhibiting irreversible color change when subjected to predetermined temperatures. **(323)**

More Ideas of the Month on pages 118 and 119

FACTORY
MANAGEMENT AND MAINTENANCE
. . . PRESS TIME REPORT • OCTOBER 1958

Cost Index of Plant Maintenance



Cost Index Holds Steady

Materials prices rise while seasonal factors trim the cost of factory wages.

FACTORY'S COST INDEX showed no change from July to August, registering 168.2 for each month. The steadiness of the over-all Index resulted from a rise in materials prices being offset by a drop in wage costs.

The drop in the Index's labor component is deceptive, however. It was caused by a slight drop in average hourly earnings for manufacturing labor. But the decline was not due to a reversal in the trend of rising wages for factory workers. It was a seasonal phenomenon, stemming from large-scale hirings of low-paid workers in tobacco and food processing. The increase in the number of these workers pulled down the average hourly earnings figure for manufacturing labor as a whole.

A look at the individual categories of factory labor indicates that wages are still heading upward. Of the 21 major manufacturing industry groups listed in the Bureau of Labor Statistics Employment, Hours, and Earnings report, 10 reported a rise in average hourly earnings from July to August. Eight recorded no change, and only three registered declines.

Though wages are still on the rise, they are not climbing as steeply as in recent years. Last month's crucial Ford-UAW wage settlement is a case in point. The union's gains were the least it had achieved in an agreement with the auto industry since the war. For the time being at least, labor is not so firmly ensconced in the driver's seat in its bargaining with management.

	AVERAGE 1957	AUGUST (Preliminary)	JULY (Revised)
Building and Facilities Index	156.9	160.8	160.4
Materials	140.6	138.4	137.6
Brick	147.8	148.5	148.5
Elec. fixtures	128.0	128.9	128.9
Elec. switches, boards, fuses	175.7	182.6	182.6
Elec. wire, copper	136.6	123.7	122.1
Glass	152.6	152.5	152.5
Gutters, spouts, ducts	169.4	175.7	170.1
Gypsum products	134.5	140.8	140.8
Heating equipment	128.2	127.4	127.2
Lumber	126.7	125.6	123.5
Millwork	147.1	145.9	145.9
Paint	128.1	130.0	130.0
Pipe, cast iron	165.8	170.4	170.4
Pipe, steel	188.1	195.8	190.1
Pipe & tubing, copper	156.0	144.2	147.2
Roofing	129.8	112.4	112.4
Sanitary fixtures	151.4	140.8	140.8
Sash, metal frame trim	145.7	147.2	147.2
Solder	121.2	116.5	114.7
Steel, structural	222.0	236.3	227.7
Tanks, steel	138.3	137.5	137.5
Valves & fittings	159.9	161.7	161.1
Wire mesh	166.9	162.9	162.9
Labor	167.7	175.8	175.6
Carpenters	154.6	163.1	163.1
Electricians	174.5	184.6	184.6
Painters	174.0	179.8	179.2
Equipment Index	169.9	171.4	171.5
Materials	167.7	169.2	168.8
Abrasives	154.1	160.4	160.4
Alloys, non-ferrous	127.2	116.0	115.4
Bars & plate, steel	214.8	227.2	220.9
Bearings	166.2	160.5	160.5
Belting	150.9	150.0	150.0
Bolts, nuts & screws	222.9	230.6	230.6
Chain	177.6	184.0	184.0
Controls (electrical)	175.7	182.6	182.6
Gear-reduction units	180.4	181.7	181.7
Hand tools, mechanics	185.1	192.3	192.3
Lubricants	87.8	80.1	80.1
Motors	143.5	148.1	148.1
Non-ferrous metals	133.3	118.3	116.3
Precision tools	150.2	153.2	153.2
Pumps	177.2	183.8	183.7
Tools, cutting	162.3	160.5	163.2
Valves & fittings	159.9	161.7	161.1
Labor	171.5	172.9	173.3
All mfg. labor	167.5	171.4	172.2
Machine tool labor	175.4	174.4	174.4
FACTORY'S COST INDEX	166.0	168.2	168.2

FACTORY
MANAGEMENT AND MAINTENANCE . . . PRESS TIME REPORT • OCTOBER 1958

Looking Ahead in Labor

Startling productivity gains are showing up in the latest government figures—so high that federal economists are almost unwilling to believe them.

The Federal Reserve Board puts the estimated gain shown over the past 12 months at an amazing 7%—"or more." Most of this gain has come since the recession—it's registered in the period from early spring. The experts aren't publicizing the figure for the time being, pending a study of what's hiking the output per-man-hour level.

But there's one good guess: Automation has come into full swing in 1958. The recession forced employers to make full use of their automated equipment. They dropped outmoded production methods, concentrated on the new technology, got along with fewer workers.

Thus, when the break came, plants were ready for expanded production with better machines and smaller workforces. There's an FRB figure that supports this theory: Between April and August plant production climbed 7%; factory employment rose only 1%.

•

The six-month gain in productivity makes the recent labor contract settlement in the auto industry all the more mysterious—on the surface.

UAW's Walter Reuther talked an expensive contract until settlement time—and came away with a 30¢-an-hour package over the next three years. The big surprise is that wages are tied to a productivity figure of 2½%. This figures out to 6 or 7¢—the same amount the workers have been collecting during the past two-year recession.

Why did Reuther buy this contract? There are several apparent reasons:

. . . *He was bargaining out of a still-hanging business downturn*—new model car production had not yet wiped out the memories of auto layoffs.

. . . *He didn't want his workers out on the sidewalk again so soon.* Nor did they want it.

. . . *Workers weren't keyed for a strike.* The tipoff: They had worked several months without a contract.

Reuther didn't altogether give in to the auto industry. Though the gains in wages are modest, you'll note the concentration on security issues. These can be "sleepers."

For instance, UAW now has a severance pay deal ranging from 40 hours' pay for two years' service to 1200 for 30 years or more.

Another key clause: Employees who are on a short workweek will get some credit for the non-working hours to go toward supplementary unemployment benefits. These weekly jobless payments are increased to a full 65% of take-home pay.

One more important item: an 8¢ increase in the base pay of skilled workers.

•

All these items lead to one bargaining point—the era of automation. The UAW wants job security and rewards for the shifting trends in production.

UAW is betting, in effect, on a declining or non-advancing workforce in the auto industry. Those who lose to automation will get unemployment and severance pay. Those who stay on will develop higher skills—and collect an increased differential.

One thing to watch for in the wake of the auto settlements: Local plant contract adjustments are being made, and these are often by pattern. If the auto union seems to be making out well, it could be from understanding between the top-level bargainers. If contracts appear modest, it could mean they traded off for some changes in local plant conditions.

•

The auto settlements already cast their shadow ahead to next year. The United Steelworkers has opened up for 1959—with President David J. McDonald promising a strike for a sizable contract.

But with reality staring the steel workers in the face—with the auto workers collecting just 10¢ plus cost-of-living in 1959—USW may have to temper its demands. Also, the steel industry has been paying a high-priced steel contract through the recession and, leaning on the auto contract, will be out to make up the difference.

SEE LABOR RELATIONS NEWS, PAGE 184

Corrugated box with built-in protection

Hotpoint ovens travel to kitchens in custom-designed Hinde & Dauch shipping boxes. Interior packing prevents damage, keeps appliances in factory-new shape. Does your product need king-size protection? Better see H & D.

HINDE & DAUCH

Division of West Virginia Pulp and Paper Company

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15 FACTORIES • 42 SALES OFFICES

Millions of operating dollars are waiting to be saved

(by plant managers who adopt organized lubrication)

Concept of Organized Lubrication to save cash in 5 areas of plant operation is proving to be a most fertile field for plant-wide cost control. Two reports now available from Texaco on opportunities, methods, case histories.

"Millions of dollars have already been saved in the operating costs of plants where management has recognized the importance of lubrication and has organized planned lubrication programs. Millions of dollars are waiting to be saved in plants where management has not yet become aware of the benefits of organized lubrication."

The entire July, 1958, issue of *Lubrication* magazine is devoted to "Organized Plant Lubrication." The statement above summarizes the issue's findings.

In effect, this and other writings on the subject reflect the fact that here is a relatively new and certainly fertile field for real cost savings in plant operations.

There's enough evidence in to cause excitement among the experts. Among the experts are the men who are putting Organized Lubrication to work—the plant managers and their team of engineers.

For, in assuming the large burden of satisfying the corporate measure of profit and loss on their units, plant managers have been quick to adopt new concepts and practices that result in plant-wide savings, such as planned overhaul, professionalized purchasing and organized quality control.

Most of these have been cost-controlling programs. So is Organized Lubrication. From the evidence in so far, this can prove to be one of the most fertile of the new plant managing practices.

Why? *Because Organized Lubrication can create cash savings in five ways; in inventory, production, downtime, maintenance and equipment life. Once adopted as plant practice, Organized Lubrication is placed in harness by plant engineers, production superintendents, maintenance superintendents, and purchasing agents.*

Let's acknowledge now that lubricants alone, no matter how excellent, are not the secret; rather, it is the setting of goals, the organizing of methods, and the expertness of men who can combine a knowledge of this new opportunity with an understanding of plant practices and lubrication.

In plants throughout the country Texaco's planning book has been studied and put to use. Some large corporations have adopted its recommendations on a staff level, or have set up committees to study the subject. Many plant units report savings from 10 to 100 times the cost of the lubricant used!

If you are a member of a plant operating group, or if you are concerned with cost control in many plants, you will find this subject well worth an introductory 10 minutes or so.

SEND FOR TEXACO'S NEW GUIDE FOR ORGANIZING LUBRICATION

Limited quantity available; please attach coupon to your company letterhead

The Texas Company
Dept. F61
135 East 42nd St.
New York 17, N. Y.

Please send me Management Practices that Control Costs via Organized Lubrication.

☐ I would also like the July issue of *Lubrication* Magazine (published by Texaco).

Name_____ Title_____

Management Engineering—Worth a New Look

ASK THE AVERAGE production or maintenance executive what his biggest job is and you'll probably get pretty standard answers: "Getting production out on time" . . . "Holding costs in line (or cutting costs)" . . . "High output at low cost."

We doubt that one in a hundred would tell you his biggest job is management engineering. Operating men are results-conscious, so they put their thoughts in pretty concrete terms. They also tend to understate what they do—not because of any false modesty, but because what they do is an old story to them and without a glimmer of glamour. After all, "management engineering" is an imposing mouthful, and it's understandable that a busy plant man should be more interested in getting the results he wants than in analyzing and classifying the process he goes through.

Nevertheless, whether you use such a high-sounding label, we submit that most of you who read this are practitioners of the art and science of management engineering. We suggest that it's the one really big element that binds all operating men together, regardless of their backgrounds or specific job responsibility, regardless of whether chemical or mechanical or industrial engineer (or no engineer at all) . . . whether in a line or a staff job . . . whether responsible for a whole company or plant, or just a piece of a department.

What is it? Simply the application of engineering methods and knowledge to problems of organization and control of production and maintenance. This means substituting facts for hunches and positive controls for guesswork. Of course, this isn't new. However, the use of measurement, system, order, and control in management has been growing steadily and rapidly. There is less resistance than ever to using the term "professional manager." In fact, many of our larger companies are consciously working to develop the professional manager attitude on the part of key men in all line and staff jobs.

The scope of management engineering is broad. It ranges from such a specific act as computing the return on investment of a specific piece of equipment to something as broad and basic as instituting a long-range facilities modernization program. It includes such diverse activities as preventive maintenance, production control, work measurement, and work simplification. In a word, management engineering is the process of seeing that *you* really run your operation—that *it* doesn't run you!

In looking ahead to 1959 and 1960, we suggest you might benefit (and your subordinates might, too) from taking a good hard look at the state of your management engineering skills. Are you still "hunching" along? Does that nasty word "guesstimate" crop up too often in your discussions of problems? Are you so free of controls and systems that you don't know where you're going or why? Some companies are—and so are some managers.

They need management engineering. Do you?

A Great Editor and Our Good Friend Retires

On October 1, Lewis K. Urquhart, FACTORY's Executive Editor, retired. Lew was well known to a great many readers of FACTORY. Among editors he has enjoyed the reputation of one of our top professionals in a difficult and demanding type of journalism.

We FACTORY editors have had two reactions: We hate to see Lew go because as a friend and colleague he has been an asset to our work and our personal lives. At the same time we're glad to see him retire to enjoy the well-earned fruits of 32 years of imaginative, constructive, and devoted effort on behalf of FACTORY and FACTORY's readers.

We've been selfish enough not to want to let Lew get completely away from us, so he is going to join up with L. C. (Jack) Morrow as a consulting editor. In addition, he is going to continue to do some writing for us, producing "Ideas of the Month" just as he has for the past 10 years or so. Since "Ideas of the Month" has for years been one of the most useful and popular features of FACTORY, we know you readers will join with us in the feeling of satisfaction we have at knowing that Lew will keep at it.

Lew never did like syrupy sentiments or sentimental writing, so we won't irritate him by indulging in any here. But maybe we can slide the sentiment in by suggesting to you readers that we think you'll be lucky indeed if you can see in your own plants just an occasional Lew Urquhart—the kind of "real pro" whose place you just don't fill.

Four Problem People Who Will Slow Output in Your Plant

1. THE WRONG-GOAL TYPE

2. THE WEB-OF-FATE VICTIM

3. THE SOCIAL MISFIT

4. THE PERSONALITY PROBLEM

What you can do about . . .

YOUR PROBLEM PEOPLE

Whether they're workers or supervisors, you've got to handle 'em somehow. Here's a new view of a universal and troubling plant problem—and help in solving it.

PROBLEM EMPLOYEES—You know you've got them. Some are workers, others are managers. All are expensive—they're poor performers, lower the performance of others.

For a fresh look at these problem employees (you'll see four broad types in the cartoons on the facing page), call them "underperforming employees." Immediately you gain perspective on two important points:

The reason for your concern—Basically your preoccupation with the problem employee is due to one fact only: his inferior job performance. He may be as unhinged as a stored door. You may feel considerable sympathy, might go to great lengths to try to help him. But what gives immediacy to the problem for you, his employer, is simply that he is causing a blockage or other complication in the workflow, either because he flubs his own job or interferes with others.

Your approach to the problem—If you see him as an underperformer you can stop thinking in terms of "treating" him. Few managers have either the qualifications or the right to mess around with another man's personality. By comparison, putting your head in a lion's mouth is kid stuff. But once you think of your problem people as underperformers, you see that your efforts must have the simple objective of bringing performance up to a normal or desired level. If you succeed in this, your problem is solved. If you don't, anything else you may accomplish in the way of a cure is still going to leave you with the same problem you had at the outset.

The general assumption that problem employees are psychological misfits just isn't true. Barring procedural reasons, such as poor training or basic lack of aptitude, your underperformers break down into four major types. You'll recognize them in the text that follows—which will also provide you with some guides for handling them.

1. The Man With the Wrong Goal

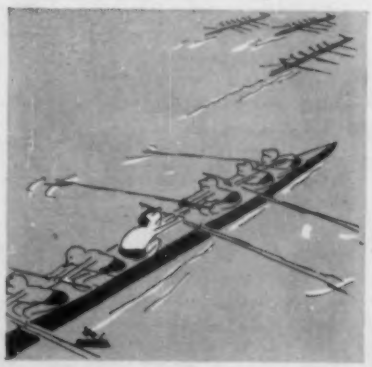
"I just can't do a slipshod job," says this employee in answer to his boss's statement that he's spending three hours on a half-hour task.

"We're all one big happy family," says the supervisor with rock-bottom productivity and total lack of discipline in his department.

"Don't care if you do need it, Procedure 3456 is perfectly clear on this," says the staff man who places the procedure book above his job—service.

And there's the empire-builder, preoccupied with carving his own niche in the organization, indifferent to the discord he creates. If you have any doubt as to whether he's a problem, haul his boss and his colleagues out from the heap into which they've been pushed by the empire-builder's ascent, and ask them.

Why the wrong goal? To deal with the problem of management's wrong-goal Corrigans, consider the case of the subordinate who insists that he knows better than his boss just what is needed to complete a given assignment satisfactorily. He may be an engineer, a technician, anyone whose job gives him a certain amount of time latitude. He's slow, and explains his slowness on the grounds that the task requires the time *he* gives it, rather than the time his supervisor allots.



What's involved here is a conflict of goals—his and yours. To know

By AUREN URIS
Research Institute of America
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Be Sure You Aren't Your Worst Problem

You may feel you're not the problem—that somebody else is. But can you be sure? Self-questioning is the beginning of wisdom. So, before you say absolutely that you're not the problem, try the quiz below and see how you come out. You'll find how to rate yourself on page 83.

1. Do you hate your boss?

2. Do you feel all your associates get a better break than you do?

3. Do you often phrase your criticism of top management by saying, "If I were running the show . . ."

4. Is your personal efficiency hamstrung because your subordinates are guilty of the following . . .

. . . Can't follow orders.

. . . Have no ideas.

. . . Have no ingenuity.

. . . Are disloyal backbiters.

. . . Can't shoulder responsibility.

5. Do you feel your boss is a poor performer because he . . .

. . . Can't give acceptable orders?

. . . Doesn't encourage your ideas?

. . . Doesn't give you a chance to exercise your ingenuity?

. . . Has such a low character that he doesn't deserve your loyalty?

. . . Never delegates?

6. Do you think your boss is right 95% of the time?

7. Do you think your boss is wrong 95% of the time?

8. Are you so much impressed by your boss's capabilities that you feel it's foolish to make decisions without his guidance?

9. Do you feel you never get enough credit for what you do?

10. Do you think your boss watches your every move, ready to pounce at your first misstep?

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"If you understand the real reason

how you should proceed you've got to devote some tough-minded thinking to this basic question: What is he really after?

Several possible motives—and countermeasures—present themselves. You must solve the question of his motivation before you act. Once you understand the reason for his behavior, your appropriate action becomes almost automatic. Here are some possible motives—and their solutions:

Possibility. He's trying to buck you. He's trying to avoid your authority by interposing a reason for his disobedience that you, as a conscientious superior, can't easily brush aside.

Solution. You must let him know tactfully but firmly that you're on to his game. Since you're the boss, you must insist on his doing the job according to the standards of quality and within the time schedule you assign. Of course, your judgment should be backed up by precedent—examples of similar jobs that have been done within the time limits you're suggesting.

Possibility. He does indeed have high standards that you might consider accepting.

Solution. You may want to defer to his judgment. But don't make it seem like backing water. By coming around to his view with wholesome conviction that you've learned something, you can give him the praise his accomplishment deserves. In so doing, you've both grown bigger.

Possibility. He doesn't understand your goals or standards, doesn't see why they should be more acceptable than his.

Solution. Training, training, training—even if it means sitting down with him and starting from scratch with the basic purpose of his job or function.

Possibility. He hasn't given the matter any particular thought, and the three hours required to do a half-hour job just happens to be how the assignment worked out.

Solution. Chances are, his general job performance is sagging. He may need re-motivation, more of your supervisory time to bring him up to the mark.

Possibility. You guessed it. He's out for himself. He's interested primarily in his own interests and convenience.

Solution. Here you're face to face with a highly motivated eager beaver. To face up to this situation, think for a moment of the empire-builder, who intends to build an empire on the bones of the men on the ladder above him.

It's not easy to counter his argument, "I'm taking care of No. 1. Why shouldn't I?" without sounding like a Pollyanna. What can you say? Your admonition, "Tut, tut, Clarence. We have somewhat higher ethical standards in the Athenia Furnace and Foundry Company," will probably get you a loud horse laugh.

If you're certain of your diagnosis of his motives, here's a suggested approach: "Clarence," you say, "I've been watching you the last few months. As I see it, you're doing all you can to win the managership of Department X. Fine. I'm impressed by the energy and ingenuity you're using to achieve that objective. But as your superior (or colleague, or friend, whichever way you want to put it) I want to point out certain truths:

"First, regardless of any other consideration, I expect you to perform your assigned tasks up to standards we both understand and accept. Second, I should point out that your type of competitiveness begets like competitiveness. This should tell you not to be surprised if the people on whose toes you've been treading don't like it—and respond by kicking you in the teeth."

If, after your talk, your summit-minded subordinate satisfactorily performs as you've requested, your only course, as long as he isn't causing noticeable damage to the organization, is to stand on the sidelines and watch him wage his private war—unless you yourself want to take him on as an adversary.

Sound gory? Well, so were the combat-preparation films shown to our G.I.'s during World War II. But they also shattered countless pairs of rose-colored glasses and acquainted individuals with the harsh but unavoidable realities.

for problem behavior, correct action is automatic"

2. The Web-of-Fate Victim

Novelists, dramatists—and personnel managers—could write books about this problem. The ancient Greeks particularly loved the drama that portrayed a well-meaning but powerless individual slowly being crushed under the weight of a relentless fate. On the work scene you see a contemporary version of this drama. The employee is subject to a pressure that, because of his particular make-up, he cannot withstand. Take three examples:

. . . *He's the employee who "can't stomach dirt"*—and is directed to clean the air-conditioning ducts.

. . . *He's the all-man man who suffers the fate of working under a female boss.* (Does he become a problem? Ask his wife.)

. . . *He's the paperwork-hating supervisor who always gets the job of keeping the records straight during annual inventory.*

In dealing with the web-of-fate victim you have four possible courses to follow:

Judge the complaint—In some cases, the problem arises because the employee's sense of his own convenience is violated. He'd rather not take on the task because it's unpleasant, or he feels there's a better assignment coming up. If you're up against this situation, however tempted you may be to be a good guy and accede to the request, don't be hasty. You may be making big troubles out of little ones.

An executive was recently told by a new stenographer that she'd rather not work for Mr. Jones, one of the executive's assistants. Her reason: Mr. Jones wasn't a good dictator. The executive, wisely foreseeing the difficulties he'd create by letting the girl pick her own assignments, explained that taking dictation from Mr. Jones was part of the job she was hired for. He was sorry about the difficulty, he concluded, and suggested that a discussion between the girl and Mr. Jones might ease the problem.

But once in a while you find an instance where the employee's problem is persuasive. A billing clerk, Rose, worked in a suburban factory office. One morning she came in and found a mouse busily munching a candy bar she had left in her desk drawer. The girl was terrified of mice. After the hysterics were over, she told her boss she'd rather quit than run the risk of being confronted again by a rodent of any kind or size.

Her employer, gaging the depth of the girl's fear, told her he'd remedy matters. He made two phone calls—one to a local exterminator, the other to the carpenter shop. The carpenter erected a temporary foot-high fence around the girl's desk. The exterminator solved the problem long-range. Rose, shaken but reassured, went back to work.

Re-assign the employee—Sometimes the simplest solution to the web-of-fate difficulty is re-assignment. This is generally an acceptable out where there's nothing basic about the task that troubles the employee. For example, for a girl who can take her mice or leave them, a job at the billing desk would present no particular hardship. Theoretically, then, there could be a juggling of assignments that would put Rose in a mouse-free area and give her desk to another employee.

Only if you don't run the risk of being accused of playing favorites is it possible for you to re-assign. Where you can't switch tasks, you must consider an alternative:

Ease the pressure—Sell the idea of alleviants: "Yes, it's a dirty job,

but we'll rig you up with overalls and a mask."

Go back to the case of the man who cringes because he has a woman boss. The suffering male employee might be advised: "We realize the psychological discomforts in your situation, Hercules. But Miss Smith is capable and your development is not hampered by working as her subordinate. Further, we know that nothing lasts forever. Looking to the future, chances are you'll be moving along in the organization."

Lay out the cards—If there are no practical ways you can change the situation or buy off your employee's objections, you may have to tell him that tough as fate seems, that's the way the cards lay out, and he'll have to make the best of it or consider the ultimate alternative—namely, separation. (He's probably considered that anyhow.)

3. The Man Who's a Social Misfit

"How's the new man doing?"

"So-so."

"Not good enough. What's wrong?"

"He knows his job—picked it up real fast. But he's having trouble. The other men are giving him the cold shoulder."

This is the employee who can't, won't, or doesn't integrate into the group. He can be a rough problem. He may stand out like a sore thumb because of . . .

. . . *Social or cultural background.* The college boy among a group of

FIVE COMMON PERSONALITY PROBLEMS YOU'LL

Managers or workers—doesn't matter. If they've got personality twists like these, you're probably in for trouble. But you can handle them if you're smart—and if you know when to call for help from the professional problem-handlers.

The Submissive Subordinate

The Hostile Critic

Begins on page 76

"Personality problems of your workers can put you

laborers may be accepted. But chances are, he'll be held off at arm's length and regarded with curiosity—possibly disapproval.

. . . *Personal traits or habits.* "He's different," they'll say, and point to his clothes, his interests, the food in his lunchbox.

. . . *Out-of-step experience or capabilities.* He may have more or less ability than the rest of the group.

Regardless of the cause, this type of problem can give you your severest test as a man and manager.

For one thing, you have a moral problem. Justice urges you to stick up for the individual. He has a right to his job regardless of pressure from the group. On the other hand, you may sympathize with your group, understand its solidarity has been violated.

In any case, you must decide who is to rule on the acceptability of employees, you or your group. You have only one real question: Does he do his job satisfactorily? You've got to be objective on this score. After you've answered this question, either you get rid of the sore thumb, or you have your work cut out.

World War II saw this particular battle fought out on many a factory floor. Here's a typical case: The lathe room of a plastics fabricating shop faced rising orders and a shrinking personnel roster.

"Put girls on the machines," said the division superintendent.

"The men won't stand for it," warned the assistant superintendent.

"No problem," said the foreman.

When a turning job was put up for bid, several girls applied. The foreman selected one he knew to be a serious, capable worker. Before she started he had some quiet chats with his men. Each little gabfest made a point: The girls were needed if schedules were to be met. Girls in other factories had moved into men's jobs and had worked out fine. The men had their seniority to protect them. The girl took on the job and after a bit of ice-breaking simply became one of the boys. After that, other girls presented no further difficulties.

Hints that will help—If you feel justice in the situation requires that you use your leadership to thaw out the group and help win acceptance for the problem employee, your moves should be made with an eye to the sensitivities of the individuals involved. Here are some hints:

. . . *Don't use force.* You'll only aggravate the situation by trying to get the group to accept the social misfit because you order it.

. . . *Point out the course of justice.* Everyone has a right to work for his livelihood. Make that point to your people, but state it calmly, not in the heat of argument.

. . . *Don't insist on social acceptance.* "I'll work with him," agreed a recalcitrant old-timer, "but I still hate his guts." "Fine," was the rejoinder of the savvy works manager, "that's all I expect."

4. The Personality Problem

This category covers the individual whose underperformance is due to emotional make-up. You can understand him without getting involved in psychiatric theory and psychological jargon. A simplified scheme developed by the research staff of the Research Institute of America is a practical approach.

In RIA's view, people who have emotional difficulties on the job tend to fall into one of these five categories (cartoons above):

. . . *Submissive.* He's the subordi-

FIND IN EVERY PLANT—INCLUDING YOUR OWN

The Shelter-Seeking Dependent The Self-Glorifying Braggart The Apprehensive Fall Guy

to your severest test as a man and as a manager"

nate who tends to be self-effacing. He accepts whatever the boss says. He is over-apologetic, is not likely to defend his own point of view if the boss opposes it. Generally, he reacts to the boss's authority with fear instead of respect. He underestimates his own importance—often his own abilities as well.

. . . *Hostile*. This man is over-aggressive toward his boss. He is critical of almost everything the boss does. The submissive type feels the boss can do no wrong. But the hostile type adopts the battle-cry, "The boss can do no right."

. . . *Dependent*. This type usually finds it hard to make decisions. Responsibility crushes him to the ground. Criticism from the boss makes him retire into a shell of hurt feelings. Females in this category generally break into tears when criticized. Double-checking before they act is usually not enough. These people must triple-check before they'll make a move.

. . . *Self-glorifying*. This person has an exaggerated opinion of his own abilities—believes he has more on the ball than the boss. Whenever there is a difference of opinion, he fails to give consideration to his superior's judgment.

. . . *Apprehensive*. "They're out to get me" is what underlies much of this type's thinking. He sees himself as a permanent victim. Of course, most of us fall into this frame of thought occasionally. "Six people go through a red light, but the traffic cop picks on me," is a common example. But the person for whom this becomes a fixed idea is obviously going to be grit in the human relations gears. Typical reactions: "I always get the lousy assignment." "Why do I have to come in on Saturday?" "You're always picking on me."

From the point of view of character analysis, these terms are oversimplifications. Psychologists point out that a submissive person may use the veneer of politeness and agreeability, for instance, as a camouflage for a deep-seated hostility. It's easy to get lost in the depths of character structure and unconscious motivation. To view the categories in their most useful aspect, consider them simply as descriptions of behavior rather than as definitions of basic personality structure.

If your problem employee falls into any of the categories above—if he's submissive, hostile, dependent, self-glorifying, or apprehensive—you should follow five rules in handling him, as follows:

RULE 1: Take the mirror test—"There are no problem children, only problem parents," says the psychiatrist. You may want to consider the parallel. Your emotionally overwrought or misdirected employee could be the result of an emotionally overwrought or maladjusted manager. Maybe you are the problem employee. Can you be sure your boss doesn't go home at night and tell his wife what a hard time he has dealing with you? Get your answer from the quiz (p. 78) and the panel (p. 83).

RULE 2: Plan your campaign—If you've checked out your own state of emotional health, found it good, and feel that difficulties you have been having with an employee are the result of *his* being a "personality problem," take these steps:

. . . *Verify the symptoms*. Double-check your observations. If a man has failed to obey your instructions, is it because he is a psychological problem—or because he didn't hear you? If he is afraid to make a move without you at his elbow, is it because he's dependent or because he hasn't been properly instructed? In other words, make sure in your own mind that the evidence by which you judge him is substantial and repeated to the point where you know no temporary circumstance accounts for the difficulty.

. . . *Diagnose*. Avoid the urge to play amateur psychiatrist. Don't assume your employee is suffering from an emotional difficulty until you first make sure his problems are not accounted for by any of the other three problems described—that is, that his difficulties are not of the wrong-goal, web-of-fate, or social-misfit variety. Only after you've ruled out the situational possibilities should

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"There's danger in helping your problem man over

you accept the possibility that a personality maladjustment may explain the problem.

. . . *Decide your moves.* At the outset you have to distinguish between a case that's beyond your efforts and one you can handle.

RULE 3: Don't play psychiatrist—The temptation to step in and help a man who has a personality problem can get awfully strong. It seems the human thing to do. From where you sit, the problem may seem obvious. The man whose concern for his wife is interfering with his work, for example, seems a clear-cut case. Why deprive him of the objectivity and balance of your observations? A few words man-to-man, and he'll snap out of it—you think.

But many companies that once provided training in counseling for managers feel today that counseling offers doubtful benefits considering the risks. In relationships that become thorny for even the skilled professional, the well-intentioned but under-equipped manager seems to have taken on a surgeon's role armed only with a rusty saw.

There are many good reasons why you should avoid getting involved in the emotional troubles of subordinates. Here are three:

. . . *You haven't got the time.*

. . . *You almost surely lack the skill*—unless you've been trained.

. . . *You can get trapped by your own emotional entanglements in the problem.* This can make you the most regretful person standing in line at the psychiatrist's door.

RULE 4: Help as much as you can—If you feel you can handle the situation, here's what to do—without playing with a man's psyche or violating his personal dignity:

. . . *Avoid his weakness.* If you've got a submissive person, for example, don't team him up with a domineering man. He'll get snowed under, will become even more self-effacing. Essentially you aim to eliminate the pressure factor. You refrain from giving cleaning assignments to a dirt-hater. And you keep the accident-prone man away from hazardous tasks.

. . . *Play to his strengths.* If the man who fears decision-making can do a bang-up job of ferreting out facts, organizing research data, doing detail work, give him such assignments as much as possible. For the self-glorifying person, you may be able to provide assignments in which his emotional needs can be satisfied. Tough tasks, within his capabilities, can give him the pleasure of accomplishment, make your praise logical and deserved.

. . . *Team him carefully.* It's also possible, in some situations, to build in a safeguard in the form of a co-worker who supplies a needed ingredient in the underperforming employee's emotional appetite. By pairing off an apprehensive individual with a calm, mature person, for example, you may help build up a job atmosphere that will help the problem employee achieve normal performance levels.

. . . *Help him consolidate his gains.* It takes time (yours and his) and patience (largely yours). But if you can help the unconfident man see that he has something on the ball and give him a chance to gain self-assurance by small but significant challenges you are sure he can meet, you may strengthen him just as a weak muscle can be brought to full tone by proper exercise.

RULE 5: Beware of tailoring the job—Red lights may have started flashing in your mind a few paragraphs back, at the point where job changes were suggested as a means of getting the underperformer up to par. You might agree that it's possible to tailor a job to take the cut out of it. But you might also argue that tailoring will take out the core of the job. Every job is made up of more and less demanding elements. Don't you risk changing a job to the point where a school kid could do it? The employee may indeed be able to perform the tailored job satisfactorily, but it may not be a job that needs doing—and his salary will become a gift instead of a justified expense.

Admittedly there's a danger you may help the man over the hurdle by removing the hurdle. But you can avoid this illusory solution by keeping two principles in mind:

. . . *Avoid over-tailoring.* In short, make sure that you don't cut the heart out of the job. The problem isn't to give the man a job he can do—that's usually simple, though impractical. What you're after is to redesign the job to make it easier for the employee to do. This doesn't mean changing a job into a sinecure. But you remove incidental aspects of the job—things not essential in themselves but critical because they represent special hardships for the employee.

. . . *Re-examine the tailored job.* After you've made job changes, look at what's left. Is it a full job assignment? Have you replaced parts removed by other elements that the employee can perform? Is there still enough challenge in the job? Finally, make sure you haven't done violence to job content in relation to compensation.

RULE 6: Don't play favorites—"You've told John he doesn't have to go out into the field," an employee complains. "Why don't others get the same privilege?"

Fact is, John is a hypochondriac. Trips away from home base are emotional ordeals for him. Of course you're showing John special consideration, but you feel his years of loyal service in other jobs justify the move. But how do you handle the complaint?

The nature of the complainer is the key to your answer. If you feel he's capable of accepting an explanation that intimates the truth without your betraying John's confidence, you might say: "John's been having some problems in connection with his field trips. I don't feel free to go into detail. But I'm sure you'd agree that we shouldn't demand that John take on an assignment that is the cause of distressing emotional problems for him.

If you feel the complainer is unsympathetic, you may want to put the case somewhat more bluntly: "We make it a policy not to demand that anyone take on an assignment that causes personal difficulties. If that should ever be true in your case, for example, I'd be glad to give you the same consideration."

RULE 7: Weigh your final move—If you feel there is nothing you

the hurdle by removing the hurdle"

can do to solve the problem, three moves are possible:

. . . *Consider a transfer.* Even for an individual with a decided personality problem, a change in job environment that plays to his strengths instead of his weaknesses may be a practical solution. A strongly antisocial person, for example, may turn in a satisfactory performance in a lone-wolf kind of assignment. Or an over-dependent person can have the heat taken off him by being put in a job with no judgment or decision-making elements and a supervisor readily at hand.

. . . *Suggest professional help.* But do it tactfully, or you'll brew a storm. You may not be the best person to make the suggestion. A personnel director, company doctor, possibly even a close friend of the individual may be more suitable.

Mental health facilities vary greatly from community to community. If your company doesn't already know pretty much what's around in the way of practicing psychologists, psychotherapists, or organizations that include such specialists, you might ask your personnel officer to gather the information.

. . . *Resort to severance.* It's a final alternative you must consider when all else fails.

SEEING THE BIG PICTURE

This discussion has been close-up. To regain perspective, it's a good idea to step back and look at the problem from long-range.

No employee works in a vacuum. How well he performs is the result of a dynamic situation that involves his boss; his job; his ability, training, and experience relevant to the job; his group; department atmosphere; company atmosphere; his home adjustment. A change in any of these may convert a problem type into a prize worker—or *vice versa.*

Over several years, Fred M., a department head at the Celanese plant in Newark, N.J., had developed a unique reputation. His department was known as a sort of "human repair" department. At Fred's invitation during the help-scarce war years, the problem employees of other departments were transferred into his charge. Surprisingly, a large percentage of these individuals who were "problems" in other situations did fine with Fred.

What did Fred do that was different? He took the view that you did the same thing with the problem employee as with any other. The difference? It was emphasis on supervisory attention to them. They might have needed more careful instructions, closer progress-checking, more follow-up. But Fred held the view that you didn't "treat" the individual, you simply worked with him in the context of his job.

We can't all be like Fred M. There's a touch that makes some people standouts in handling personal relationships. But every manager must have a rationale for dealing with the underperformer. He must know the answers to six questions:

1. Is he expected to counsel the emotionally misfit? (Supervise, yes. Counsel, no!)
2. How much non-cooperation is he expected to put up with? (This comes down to a cost question.)
3. To whom may he turn for consultation in dealing with problem employees? (Professional help may be available, and there's one's boss.)
4. How bad must the problem worker be to be fired? (Company policy or precedent may be your answer.)
5. Does the answer have the benefit of a clear company policy on transfer of the failing employee?
6. Under what kind of supervision will a problem employee do his best work?

SEEKING THE GOAL

The base you always must come back to is your aim: to bring an underperformer up to normal. With this in mind you'll avoid the traps of do-goodism, the unlicensed practice of psychology, and meddling.

Your interest in your problem employee is his work. Once you get this idea straight, you're on to a really hot follow-up—the possibilities for bringing all employees up to a larger percentage of their potential performance.

How You Rate as a Problem

Here are pointers for rating yourself on the quiz on page 78:

1. If your answer is "Yes," you're a problem to your own boss. The rights and wrongs of the matter call for your objective consideration. Deep probing may call for a heart-to-heart talk with him—and perhaps your move to get a transfer. The point is this: A hateful boss, whether he doesn't or does deserve the venom, is a great handicap to the men he directs. Ulcers are usually the product of the union.

2. If you do, better establish whether your view is fact or fancy. If it's fact, better find out why—and, armed with facts, seek a remedy. But if facts are missing, your view may be inaccurate because your own expectations are unreasonable.

3. If you tend to see yourself running the show, chances are your ambitions are outdistancing your accomplishments. Give the latter a chance to catch up.

4 and 5. These are twin questions, wth the letters so paired that they make a point. If you answered "Yes" to the first subhead of 4, can you find any new light on the other side of the situation in the first subhead of 5?

6 to 10. These questions are designed to confront you with the probability that you may be, respectively, submissive, hostile, dependent, self-glorifying, or apprehensive. If you answered "Yes" to any of these questions, your boss may be exactly what you think he is. But he may not be. You must decide.

A final word: Chances are, neither you nor your superior is perfect. We're all problems, to some extent, to ourselves or our superiors. Our best chance of minimizing the problem is to realize that job performance is based on emotional and skills development. The more mature we become and the greater the job skills we develop, the less our working life represents the sweat by which we earn our daily bread. Our working life can, in fact, become a rewarding occupation.

Teaming Up for Better Methods

A cracker-jack process engineering department that keeps its eyes open is the key to this company's fast changes from outmoded methods to new.

NEARLY 50 YEARS of shop and manufacturing experience is the opener-up to successful methods improvement at C. A. Norgren Company (Englewood, Colo.). Norgren specializes in pneumatic products, has a process engineering department that isn't satisfied with good enough.

Tool Engineer A. H. Wilcox heads up the process engineering staff. Wilcox, along with two assistants, can claim almost 50 years of experience. Payoff? Look at these eight case studies (here and on the following page) in methods improvement, then answer for yourself.

Process engineering plays no passive role at Norgren. The department handles all tool and machine design, special machine building, tool maintenance storeroom, and machine maintenance. Wilcox or his assistants see all parts orders, which include data on set-up time, production rate, total job time, and machines that will be used. Orders for new or changed parts stay in process engineering until the tooling is complete or the machines are made—then are released for production.

There's a round-the-clock watch on parts orders to see if quantities warrant the cost of special tooling or other equipment to increase production or cut cost. A part may be machined on a conventional drill-press or handscrew machine for years before the quantity becomes big enough to warrant special tooling. Then there's the story of close cooperation between process and product engineering to assure a match between design of new parts and the best method of operation.

Now, for a detailed rundown of the smart ideas in methods improvement that this system has developed for the Norgren Company, read on.

Second-ending cuts labor

Problem—Final machining (second-ending) on a hand-screw machine was often necessary, but it was always tedious, too. The operator had to load the part, close the collet, and operate the turret for centering, drilling, threading.

Solution—To eliminate as many operations as possible, Norgren took a 2G Brown & Sharpe automatic and converted it to second-ending machining. Process engineers changed the collet closing cam and installed a magazine for the parts on the front cross-slide, allowing the parts to slide down, one at a time, into position in front of the spindle. A spring-loaded pusher in the turret feeds the part into a spring-loaded stop, where the collet grips it. The turret and the cross-slides automatically go through the various operations. All the operator now has to do is keep the chute filled with parts.

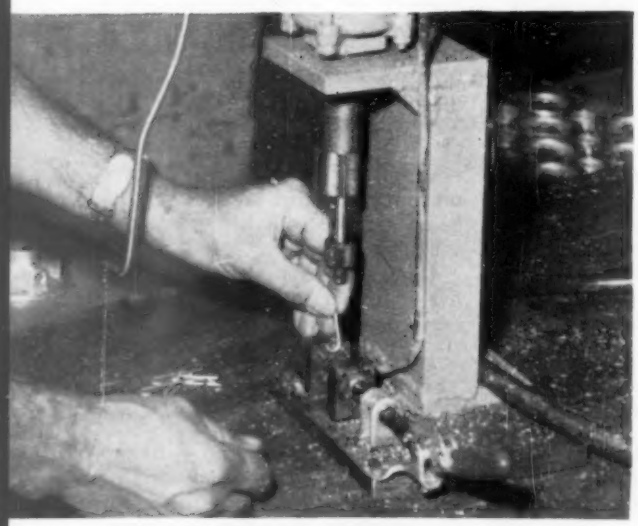
Gains—In addition to labor savings, production rate increases range from 20 to 100%.

This new test clamp doubles inspection speed

Problem—Inspection of airline filters by hydrostatic testing was slow—too slow for best efficiency. Each filter was submerged in water while high-pressure air was applied. A toggle clamp was closed over inlet and outlet ports of filter. An airline, controlled by a foot valve, was connected to clamp.

Solution—Process engineering came up with this new clamp (photo, left). Clamp uses a small air cylinder that is also a handle. Two flexible hoses bring air to cylinder and test portion of clamp. Air control valves (Norgren's) meter air to clamp, allow it to close instantly, permit the air pressure to build up in one or two seconds. The clamp is operated by a thumb-actuated microswitch.

Gains—New clamp is lightweight, easier to use than old clamp. And inspection is faster by 100%.



Tube bender cuts material waste

Problem—Small hand-operated lever and roll device was used to bend oil drip tubes for airline lubricators. Tubes (3/32-in. OD)were bent to form a 1/8-in. radius end. But because of inconsistency of bend, an extra 3/32 inch of tubing was allowed at drip end of tube. After bending it had to be trimmed off.

Solution—Norgren developed a tube bending apparatus (photo) in which an air cylinder and die produce the bends so much more accurately that the excess 3/32 inch of tubing isn't required any longer.

Gains—Saving is 116 feet of stock on a run of 15,000 parts. Also production is up 25%.

Indexing drill ups production

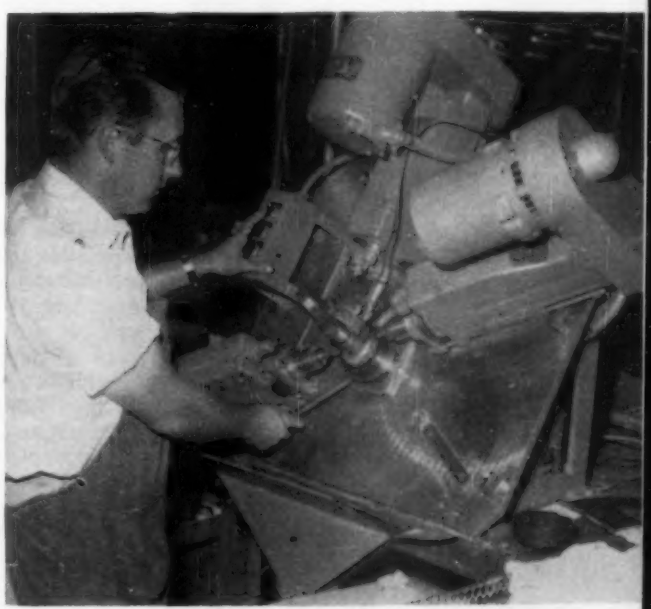
Problem—Efficiency was low in drilling two, three, four, and six holes in workpieces. Workers found it hard to load, uncomfortable to work, difficult to see what they were doing. Quality was unsatisfactory.

Solution—Norgren designed and built this indexing machine (right). Now a part is loaded into the fixture in the center. When a button is pressed, an air-cylinder-operated clamp swings over into position through a cam action and securely clamps the part.

Handle of fixture is moved to right or left and snapped into drilling position. Drilling units automatically complete the drilling cycle. Handle is moved to opposite side and another cycle completed.

Gains—Production is now 20 to 70% faster. There's less downtime and quality is better. Visibility is better, loading and unloading is easier, problem of chip removal is eliminated (90% of chips fall away, air stream cleans out the rest).

Turn the page



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Air motor speeds cross-drilling

Problem—Production of lubricator checkvalve bodies was averaging 240 pieces per hour with much of the operating cycle used in cross-drilling. Norgren wasn't satisfied with this performance. It took a system of pulleys and belts working off an overhead drive, along with an OG Brown & Sharpe automatic, to do the cross-drilling.

Solution—A 14,000-rpm. air motor is mounted on the cross-slide. A lever on top of the motor contacts the swing stop bar when approaching drilling position. Now the cross hole is drilled faster and without the use of a guide bushing.

Gains—Production is now up to 554 parts per hour. Also, less downtime, fewer broken drills.

Pushbutton tester speeds inspection

Problem—Testing pressure regulators to find possible leaks and to check on performance takes 10 minutes at Norgren. Each test checks valve and valve seat for leaks and body porosity, and checks threads for their seal. The old bank of testing equipment had an output of only 3.6 units per minute.

Solution—Process engineering got busy, soon came up with this console pushbutton tester (photo). At the press of a button clamps approach and position the body. They seal all ports and depress the spring rest to a pre-set pressure, as the adjusting screw would do in normal use. A second button checks the regulator for valve function; a third button checks it for relief characteristics; and a fourth button, acting in conjunction with a diaphragm-actuated indicator, allows the operator to determine the "creep" or leaking of air from primary to secondary side of the regulator. Secondary pressures are also pre-set and can be changed instantly just by pressing a button.

Gains—The new tester clicks off five units per minute—a 39% increase in output.

Assembly machines reduce fatigue

Problem—Assembly was slow, tiresome. Because many Norgren products are used with other Norgren products (such as filters with lubricators, or filters with pressure regulators and lubricators), assembly was a hand job. Workers linked units with threaded adapters, used long-handle wrenches.

Solution—Norgen built two machines that do assembly work simply. Lubricator is placed in fixture and clamped tight, using an air wrench suspended and balanced for easy handling. Adapters, regulators, and filters are started by hand. Air wrench is lowered, quickly tightens unit together. Stops are provided to assure alignment of the three individual units.

Gains—Work is easier. for the operator. Speed is up 25%.

This new machine is 10 times better

Problem—Production rate on a valve seat and head that fit into a pressure regulator valve body was a low 75 to 80 per hour. Valve assemblies were assembled in a hand-screw machine.

Solution—Norgren developed the machine with a circular index table, three air motors, 12 special nests, and an air ejector for finished assemblies. Automatic timer controls index rate.

Operator places valve body and seat in position in nest. Table indexes and air motors move down. First motor presses head into position. Part is indexed to next position. Second motor partly forms the staking operation around lip of valve body. In third position staking is completed. Assembled valve is ejected into parts bin.

Gains—Production rate is now 800 finished assemblies per hour.

Quick Way to Measure Long Jobs

With this new system, now revealed for the first time, you'll get standards for long-cycle and one-of-a-kind jobs in record time—and collect bonus benefits.

NEWEST TOOL for measuring long-cycle operations (two minutes or more) is Unified Standard Data (USD). At right and on the reverse side of this page (so you can cut it out) are all the elements of a complete data card for use with this new system.

You can use USD for repetitive or one-piece jobs. It's based on MTM (Methods-Time Measurement) values. But you can apply it five times faster than MTM.

What you'll gain—A technique that's good for one type of work may not be best for another type. That's why, when we list the advantages of USD, we mean advantages from the standpoint of long-cycle or variable-assembly work for which USD was designed.

(Editor's note: The "we" of this article are the men of H. B. Maynard & Company, management consultants, Pittsburgh. Since 1954 Grant Clapper, Maynard's senior consultant, has directed the development and field testing of this brand-new contribution to the field of work measurement. Now in FACTORY, for the first time anywhere, Maynard's research department reveals the details of this new development.)

In test applications USD has produced seven gains, as follows:

. . . *Faster development of standards.* The system combines basic MTM motions into larger units of work, thus reduces the number of minor decisions required when studying a job.

. . . *Accurate standards.* USD uses minimum grouping and averaging. Individual standards are accurate. The data are well suited for wage incentive plans.

. . . *Firm records.* Each method is recorded in the analysis. This provides a permanent record of the standard method.

. . . *Easy application.* Work elements are large enough to be easily understood, yet small enough to be universally applicable within each class of work. After you

UNIFIED STANDARD DATA

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H. B. Maynard & Company, Inc.
Pittsburgh 21

	WALK	OBSTRUCTED		UNOBSTRUCTED	
	Turn and walk ONE pace.	W11	36	W21	34
	Turn and walk TWO paces.	W12	53	W22	49
	Turn and walk THREE paces.	W13	70	W23	64
	Turn and walk FOUR paces.	W14	87	W24	79
	Turn and walk FIVE paces.	W15	104	W25	94
	Turn and walk SIX paces.	W16	121	W26	109
	Turn and walk SEVEN paces.	W17	138	W27	124
	Turn and walk EIGHT paces.	W18	155	W28	139
	Turn and walk NINE paces.	W19	172	W29	154
	Turn and walk TEN paces.	W110	189	W210	169
	Turn and walk ELEVEN paces.	W111	206	W211	184
	Miscellaneous WALK, GET and PLACE Elements	First	Last	Symbol	TMU
WALK					
GET					
PLACE					
	USE ELEMENTS	First	Last	Symbol	TMU
HAMMER	Very light tapping-Controlled accuracy & force.	M1B	M1A	UH11	11
	Light tapping-Noticeable control.	M5B	M5A	UH12	15
	Normal Hammering-Minor or no control.	M10B	M10A	UH13	24
	Heavy Hammering.	M18B	M18A	UH14	35
	Very Heavy Hammering.	M30B	M30A	UH15	51
MANUAL	Spin on (or off) threaded object with one finger.	R3E	M3B	UM11	11
	Finger motions-run th. obj. in (or out)-no sticking.	R3A	M3B	UM12	15
	Finger motions-run th. obj. in (or out)-sticking, moderate pressure.	R3A	M3B	UM13	26
	Finger & arm motions-run th. obj. in (or out)-heavy pressure.	T120	T120S	UM14	34
	Finger & arm motions-final tighten.	R4A	AP1	UM15	44
POWER TOOLS	Get and replace suspended power tool.	R26B	R24E	UP11	105
	Get and replace power tool on work bench.	R20B	R20E	UP12	90
	Change sockets on power tool.	R4B	R4B	UP13	117
	Change direction on power tool.	R4D	R4B	UP14	32
SCREWDRIVERS	Standard screwdriver-finger motions-very light resistance.	R2A	M2B	US11	16
	Std. screwdriver-turn motions-slight resistance.	T10S	T10SS	US12	20
	Std. screwdriver-turn motions-pressure (AP2) on each turn.	T10S	T10SS	US13	30
	Std. screwdriver-turn motions-heavy pressure(AP3) on each turn.	T10S	T10SM	US14	40
	Spiral screwdriver-short stroke (5" or less).	M3C	M3A	US15	15
	Spiral screwdriver-long stroke (6" to 15").	M10C	M10A	US16	29
	Std. screwdriver-open small cotterpin (5/64" diameter or less).	M4C	T90S	US17	132
	Std. screwdriver-open large cotterpin (over 5/64" diameter 3/8").	M4C	T90M	US18	190
TONGS	Open cotterpin with special pin and wedge pliers.	M4C	D1E	UT11	124
	Cut off soft wire with nippers.	M4C	AP2	UT12	52
WRENCHES	Open-End or box-end-short; second knuckle 5" or less fr. bolt axis.	M3C	M1B	UW11	34
	O-E or b-e-long; second knuckle more than 5" fr. bolt axis-no sticking.	M5C	D1E	UW12	47
	O-E or b-e-long; heavy pressure needed to turn.	M5C	D1E	UW13	57
	Ratchet wrench-no sticking.	M8B	M8B	UW14	21
	Jointed Socket wrench-10"-20" dia. swing of gripping position.	M24Bm	m24B	UW15	39
	Brace-Type-5"-15" dia. swing of wrench handle.	M10B	M10B	UW16	24
	Final Tighten (expect ratchet wrench).	AP2	AP1	UW17	84

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"...standard data adapted

have trained a person in MTM, it's fairly simple to train him to apply USD.

. . . *Clear instructions.* The job breakdown on the element summary sheet automatically provides a set of instructions to the workers.

. . . *Less paperwork.* Because larger work elements are used to build time standards, you'll need less paper to make the analysis, record the method. This cuts clerical work, filing space, revision of standards.

. . . *Wide application.* USD is not limited to any special set of conditions. You can use it to develop time standards on large one-unit construction or repair work, for varied short-cycle assembly work, for miscellaneous job shop work, and for setting assembly-line standards.

WHAT USD WILL DO

H. B. Maynard & Company engineers have tested USD in several companies. First application: a tractor assembly line. A typical problem here was to set standards and improve methods used for subassembly and final assembly of seven different sizes and types of farm tractors.

Here's what made this problem complex: All seven types were assembled intermittently on the same assembly line. Lots varied from 10 to 500 tractors in a run. After methods were improved and new time standards were installed, station time (or cycle length) was 15 minutes. Total assembly time for study was roughly 10 man-hours per tractor. Only a small part of the standards was directly transferable from one tractor type to the next. Standards for other assembly operations were needed. And, to top it off, there was a shortage of methods and standards engineers.

Tough? Sure was. That's what led to USD. It proved to be a "natural" for this operation.

Other types of work on which USD has been tested:

. . . *Assembly.* Line, group, and individual assembly.

. . . *Benchwork.* Including fitting and repair.

. . . *Construction and erection.* Large units, contrasted with assembly.

. . . *Maintenance.* Work not already covered by UMS (Universal Maintenance Standards) formulas.

WHAT USD IS

It's a standard data system designed for application to a wide range of conditions. It integrates four different standard-setting approaches into one unified system. That's where we get the name: Unified Standard Data. The system is a convenient, easy way to apply at any time the most applicable of these four approaches to each work element:

Usual type of standard data elements—By this we mean repetitive work elements prepared for specific situations. Examples: "Get and replace suspended air

UNIFIED STANDARD DATA

GET - One hand, weight of two pounds or less		SYMBOL	TMU
SIMPLE	SIMPLE - One easily grasped object, no interference. (G5, G1A, or G1B) Ex: Get prepositioned tool. -- Get pack of cigarettes from table.	G11S M L V	13 23 33 43
JUMBLED	EASY JUMBLED - Get one easily grasped object, slight interference with grasp and/or selection required. (G1A + G2, G4A, or G4B) Ex: Get easily visible tool from tool box. --Get a fifty cent piece from a handful of change.	G12S M L V	21 31 41 51
JUMBLED	NORMAL JUMBLED - Get one small object from a group, some interference with grasp. (G4A + G2, G4B + G2, or G4C) Ex: Get a 4" cotterpin from a tray of cotterpins. --Get a nickel from a handful of change containing several nickels.	G13S M L V	26 36 46 56
JUMBLED	DIFFICULT JUMBLED - Get a very small object from a group, much interference or some interlocking is encountered. (G4C + 2 G2) Ex: Get a small cotterpin or spring washer from a tray, tendency to interlock. --Get the only dime from a handful of change.	G14S M L V	37 47 57 67

WEIGHT	3-10#	11-20#	21-30#	31-40#	41-50#
G15S ( ) M ( ) L ( ) V ( )	16 25 38 49	20 30 44 55	24 35 49 61	28 40 54 67	33 44 60 72

TRANSFER	
G16S	11
M	16
L	21
V	26

TWO HANDED GETS									
SIMPLE (G11)	G20S M L V	20 30 40 50							
EASY JUMBLED (G12)	G21S M L V	29 39 49 59	G22S M L V	38 48 58 68					
NORMAL JUMBLED (G13)	G23S M L V	31 41 51 61	G24S M L V	42 52 62 72	G25S M L V	47 57 67 77			
DIFFICULT JUMBLED (G14)	G26S M L V	46 56 66 76	G27S M L V	53 63 73 83	G28S M L V	58 68 78 88	G29S M L V	70 80 90 100	
TYPE OF GET IF ONE-HANDED	SIMPLE (G11)		EASY JUMBLED (G12)		NORMAL JUMBLED (G13)		DIFFICULT JUMBLED (G14)		

PALM		
1 x 1 x 1" or more 1/4 x 1/4 x 1/8 to 1 x 1 x 1" Less than 1/4 x 1/4 x 1/8"	G17A B C	11 19 27

UNPALM		
1 x 1 x 1" or more 1/4 x 1/4 x 1/8" to 1 x 1 x 1" Less than 1/4 x 1/4 x 1/8"	G18A B C	13 23 37

DISTANCE INCHES	
S	3- 5
M	6-14
L	15-22
V	23-30

PLACE	VISIBLE	BLIND
PLACE and reach back (two way place) (M_B + R.L1 + R_E) Ex: Place tool in tool box. --Toss empty carton to trash can.	P10S 13 M 23 L 33 V 43	
POSITION — LOOSE FIT (P1) or align with 1/2" to but not incl. 1/4" clearance. Ex: Place normal flat washer on bolt. --Place large (1/2" I. D. or greater) on bolt.	P11S 24 M 29 L 34 V 39	P12S 38 M 43 L 48 V 53
POSITION — CLOSE FIT (P2) or align with 1/4" to but not incl. 1/16" clearance. Ex: Place small flat washer on bolt (less than 1/4" I. D.) --Place normal spring washer (1/2" to but not incl. 1/8" I. D.).	P13S 34 M 39 L 44 V 49	P14S 60 M 65 L 70 V 75
POSITION — EXACT FIT (P3) or align with 1/16 inch or less clearance Ex: Place exactly fitting machined parts (some pressure required for entering) --Place very small spring washer (1/8" or less I. D.)	P15S 61 M 66 L 71 V 76	P16S 113 M 118 L 123 V 128
PLACE AND START threaded object one thread. (One way place)	VISIBLE	BLIND
LOOSE FIT -- No interference or burrs CLOSE FIT -- (Normal)-No interference or burrs CLOSE FIT -- Paint, burrs, or interference so pressure is needed to start	P41S 47 P43S 70 P45S 108	P42S 70 P44S 97 P46S 144

DOUBLE POSITIONING	BLIND	VISIBLE	LOOSE	CLOSE	EXACT
			P21S 37 M 42 L 47 V 52	P22S 48 M 53 L 58 V 63	P23S 75 M 80 L 85 V 90
	LOOSE	P31S 49 M 54 L 59 V 64		P24S 59 M 64 L 69 V 74	P25S 85 M 90 L 95 V 100
	CLOSE	P32S 64 M 69 L 74 V 79	P34S 81 M 86 L 91 V 96		P26S 112 M 117 L 122 V 127
	EXACT	P33S 105 M 110 L 115 V 120	P35S 121 M 126 L 131 V 136	P36S 161 M 166 L 171 V 176	
		LOOSE	CLOSE	EXACT	

REACH R_A	R_B	R_C	R_E	Dist. Inch.	MOVE MA	MB	MC
2	2	2	2	1	2	2	2
3	3	4	2	1	3	3	3
4	4	6	4	2	4	5	5
5	5	7	5	3	5	6	7
7	8	9	7	5	7	8	9
7	9	11	9	7	9	10	11
9	12	13	11	10	11	12	14
11	15	16	14	15	15	15	18
13	19	20	17	20	19	18	22
15	22	23	20	25	23	21	26
18	26	27	23	30	27	24	31

TURN						
Wt.	30	60	90	120	150	180
6 - 2	3	4	5	7	8	9
2.1-10	4	7	9	11	13	15
10.1-35	8	12	16	20	24	28

WIP 15 WIPO 17 WIFT 5	B, S, KOK 29 A..... 32	FM 9 FMP 19 LM 12	SSC1 20 SSC2 40 KBK 70 AKBK 77 SIT 35 STD 43 TBC1 19 TBC2 37	API 16 AP2 11	D1E D2E D3E	D1D D2D D3D

to individual plants"

tool at work bench"; "Run in one studbolt with manually reversible air wrench." These work elements repeat from one station to the next or from one product to the next.

This is the type of element an industrial engineer means when he speaks of standard data. Although this type is standard for a given set of conditions, you may have to revise the data (or standardize the methods) when you extend measurement from one department to another or from one plant to another.

Repetitive motion-sequence approach—In applying MTM there are several types of motions that naturally occur together regardless of the work being done. For example: *Reach to* and *Move away* naturally occur in combination with *Grasp*. *Move to* and *Release* occur naturally with *Position*. *Reach to a single object* occurs with simple *Grasp*. And so on. We have studied these combinations, synthesized and coded them into a system of standard sequences. This is one of our methods of setting a standard.

With repetitive motion sequences we carry this approach a little further and combine *Reach, Grasp,* and *Move* to form a *Get* element. We also combine *Move, Position,* and *Release* to form a *Place* element. In addition to these, we have combined certain repetitive sequences for using common hand tools into standard *Use* elements.

MTM analysis—We built up most of the USD elements from MTM analysis. This third way of setting a standard is to make an analysis of part (or all) of an element by means of MTM data. This may be required for accuracy or for a very detailed methods description. The most important use of the basic MTM data is to fill in between other elements. This way, we can keep the number of standard elements at minimum without losing accuracy.

Time study—This is the fourth way to set a standard used in USD. Sometimes (particularly on unstandardized, long-cycle assembly work), a process so closely controls all elements of work that you will find it almost impossible to study them except with a stopwatch. But the stopwatch is used to time individual elements, not entire operations. The part of the cycle established by a watch will seldom account for more than 8% of an operator's total cycle time, except in machine-controlled operations.

HOW USD WORKS

We divide all manual work into these five groups:

. . . *Walk*. Move more than one pace.
. . . *Get*. Obtain possession or control.
. . . *Place*. Dispose, position, or assemble.
. . . *Use*. Make use of.
. . . *Miscellaneous*. (Seldom used. Available for elements that the analyst does not wish to place on the USD data card.)

How USD Works on Two Long-Cycle Jobs

HAND	DESCRIPTION	FREQUENCY	USD SYMBOL	TIME-MEASUREMENT UNIT
	1. Get small tool from tool-crib, return old tool.			
—	*Arise from work place	2	LM	24
		1	STD	43
—	Go to tool cabinet at workplace	1	W15	104
R	Open drawer	1	G11L	33
L	Get old tool for return	1	G12M	31
R	Close drawer	1	P10L	33
—	Go to tool-crib (average 14 steps)	1	W214	229
L	Place return tool on counter	1	P10M	23
—	*Request and wait for new tool (Fill out tool slip)	1	M11	2000
R	Get new tool	1	G11M	23
—	Return to workplace	1	W214	229
R	Place tool on workbench	1	P10M	23
—	*Sit at workplace	1	SIT	43
		2	LM	24
				2862
	2. Run half-inch nut on stud and tighten.			
R	Get one nut from tray	1	G12L	41
R	Place and start on stud	1	P43S	70
R	Run-on with fingers	8	UM12	120
R	Get open-end wrench from tool tray	1	G12L	41
R	Position wrench on nut	1	P13S	34
R	Draw tight	1	UW17	84
R	Wrench aside to tool tray	1	P10L	33
				423

*Values taken from other standard data.

Each group is made up of standard elements from the repetitive motion-sequence groupings and from standard data elements adapted to the individual plant.

We have kept the system as simple as is possible without risking significant loss of accuracy: a consistent numbering and coding system, clear and short element descriptions with examples, and use of condensed MTM data help.

WHERE USD IS BEST

You can apply the system almost anywhere manual work is involved. But you'll get most benefit from it under one or more of the following conditions:

Long manual time—Preferably three or more man-hours' total job time for one unit. Or for a selection of related units, each of which may have a short assembly time or short cycle time.

Long operator cycle time—About a two-minute cycle for good individual accuracy with the present data. If the cycle is less than two minutes, you'll probably be better off if you make your analysis by basic MTM rather than USD.

Intermittent, variable work—Large unit construction or repair. USD is especially useful when you need

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"Accurate methods descriptions with standards"

accurate cost and standard time estimates in advance. It's suitable for visualizing work, thus useful for setting standards on one-of-a-kind jobs.

Accurate methods description needed—For standards control, methods improvement and standardization, better worker instruction and training. USD supplies accurate methods descriptions with the standards.

WHERE USD ISN'T BEST

In any methods and standards work you should always use the best available technique for a given situation. USD is not best for all situations. The exceptions are high-activity, short-cycle, long runs where you can develop time formulas readily. For example: machine operations, short-cycle standardized bench operations, or assembly work.

On very large unit work, such as building construction or electric generator erection, you might not apply USD directly. But you would use it to develop the usual type of standard data and time formulas, which would be applied in the normal manner.

HOW TO MAKE A STUDY

Here are the seven steps to follow to make your own USD study:

1. Study the method you're now using.
2. Analyze the method, improve it, and standardize on the best.
3. Break the job down into logical job elements.
4. Record the USD elements or MTM motions used to perform the job.
5. Check the study to see that the method is recorded correctly.
6. Apply the standard time for each USD element or MTM motion. Add to get the standard for the job.
7. Apply the necessary allowances to arrive at a normal production time standard.

Models to guide you—The table on page 89 shows two typical work elements analyzed with USD. You can check the TMU (time measurement unit) values here with the cards on pages 87 and 88 (except for elements that are marked with an asterisk). Values for these elements are taken from other standard data, MTM analysis, or time-study data. If they occurred often enough, they could be standardized into the USD data for plant use.

You'll find more help...

. . . on standard data in the following articles from previous issues of FACTORY. Reprints are available (50¢ per copy) from FACTORY Reader Service, 330 W. 42nd St., New York 36. Order by code number.

"Motion-Time Standards," May 1945. (No. R-3).

"Methods-Time Measurement," Feb. 1948. (No. R-4).

"How Good Is M-T-M?" Aug. 1950. (No. R-5).

"Maintenance Work Measurement," Jan. 1955. (No. R-6).

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HOW PACKAGE TESTS COULD HELP FIVE COMPANIES

COMPANY A—UNPREPARED

Problem—No testing program. Company says it doesn't have enough employees in various job classifications to set reliable standards on tests.

Comment—Common attitude in small and middle-size companies. But not correct. Fact is, the worker traits that make for success in any job are known. Package tests consolidate these traits into pre-set standards. Thus a norm for assembly workers comes by a study of hundreds of successful and unsuccessful assemblers and their performance on a similar test.

Recommendation—Use some standardized tests. Start a program by testing job applicants.

COMPANY B—BEHIND THE TIMES

Problem—Has a testing program. But the tests were put together before 1940. They're out of date.

Comment—Today's tests are more accurate, quicker than pre-war tests. Testing can be done in half an hour—with same accuracy as older, longer tests.

Recommendation—Try some newer tests along with present tests. Later, replace the longer, complex tests with the quick, short, factor-type tests.

COMPANY C—INADEQUATE TESTING

Problem—Has a testing program. But measures only the intellectual brainpower of an applicant.

Comment—Brainpower survey is first step in a sound testing program, because without intelligence any worker will have trouble in spite of interests, personality, background.

Recommendation—Add tests that measure background, interests, skills, personality, temperament.

COMPANY D—HALF IN THE DARK

Problem—Has an established testing program for applicants but hasn't applied testing methods to present employees.

Comment—Present employees are not happy because some new hires are surpassing old timers on piece-rate jobs. There are no test data for more than half of the staff. Trouble on transfers, promotions, special training.

Recommendation—Test every employee in a complete personnel inventory-audit. Audit will be best carried out under guidance of a reputable management engineer or psychological consultant.

COMPANY E—NEEDS A TAILOR

Problem—Has a well established testing program. Prediction of job efficiency is good. But it could be improved by tailoring some of the tests and standards to the company's own operations.

Comment—Tailoring a particular standard means comparing test scores and job efficiency, then setting desirable score ranges and weights. Result is a standard that really fills the company's needs and serves present workers and applicants.

Recommendation—Begin validation studies on certain of the company's job classifications. Like the audit, this study is best done under guidance of a reputable consultant.

Package Tests Will Work for You

So says this pro in personnel testing. They'll find the right slot for your people, firm up your promotion policies, give you more for your wage dollar.

NO MERE FAD, personnel testing. It's part of the hiring routine of two out of three companies. It's widely used in transfer and promotion decisions. And in competitive industries, where employee efficiency spells success or failure, it's almost a "must."

Can you safely set up a testing program in your plant without tailoring the tests to your own needs?

"No," say Alexander H. Morrison and Peter Dubno, of the Polytechnic Institute of Brooklyn, in a FACTORY article (June 1956, p. 111).

I say, "Yes." Tests with pre-set standards—most people call them package tests—are usually a company's best starting point. These tests are based on success studies of employees in the major job fields. With them, if your company has 40 or more employees in a particular job field, you can check the pre-set standards of the package test against your own employees' test results, then tailor the standards more exactly to your own situation.

BY JOSEPH E. KING, Ph.D.
President, Industrial Psychology, Inc.
Tucson, Ariz.

WHY USE TESTS AT ALL?

There are at least three good reasons to use tests—either kind of test, package or tailor-made. With tests, you can . . .

. . . *Cut wage and salary costs.* These now are estimated to run upward from a minimum of $4840 per year for each factory worker to $11,690 for each key person. Tests will help you find potentially productive people well suited to a job, and this, in turn, will cut your wage and salary costs.

. . . *Spot the best of the also-rans* when labor markets are tight. Fact is, today's advancing technology is putting a strain on the market for trained or easily trainable employees. Result: Many companies have to hire marginal workers. In this situation it's important for you to know the strengths and weaknesses of these also-rans. Proper placement of them is doubly important. Why? Because less than 50% of semi-skilled workers have aptitudes for skilled technical or maintenance work. And less than 15% of them have clerical aptitude.

. . . *Find a firm basis for promoting*

a worker. Past performance is no real gage when you promote a man from a "doing" job to a managerial job. The new job will take different aptitudes. Same goes for lateral transfers and demotions. Chances are one in five the new job will have enough differences to justify checking your man with tests.

Tests won't replace an interview. But they will give you facts—in advance—about your job applicants. Your interviewers can use these facts to pinpoint their questions and cut interviewing time to a minimum. Also, tests will measure certain traits that even the best interviewer can't spot.

WHY PACKAGE TESTS?

If your company is like most companies, it's too small to perfect its own tests and standards. It takes at least 40 workers in a specific job field to establish reliable test standards. Fewer than that, and your figures are likely to be full of errors.

So it's a lot easier—and safer—to use a test that's based on the scores and performance of hundreds or thousands of workers who do the same kinds of jobs your employees do. The manual you buy will tell you how to run the testing program—how to administer, score, and interpret a job applicant's test.

On the other hand, what if you try to validate a battery of tests at the outset in your own plant? Here are some hazards you'll face:

. . . *Employees* may not like being used as guinea pigs—may even veto your program through union action.

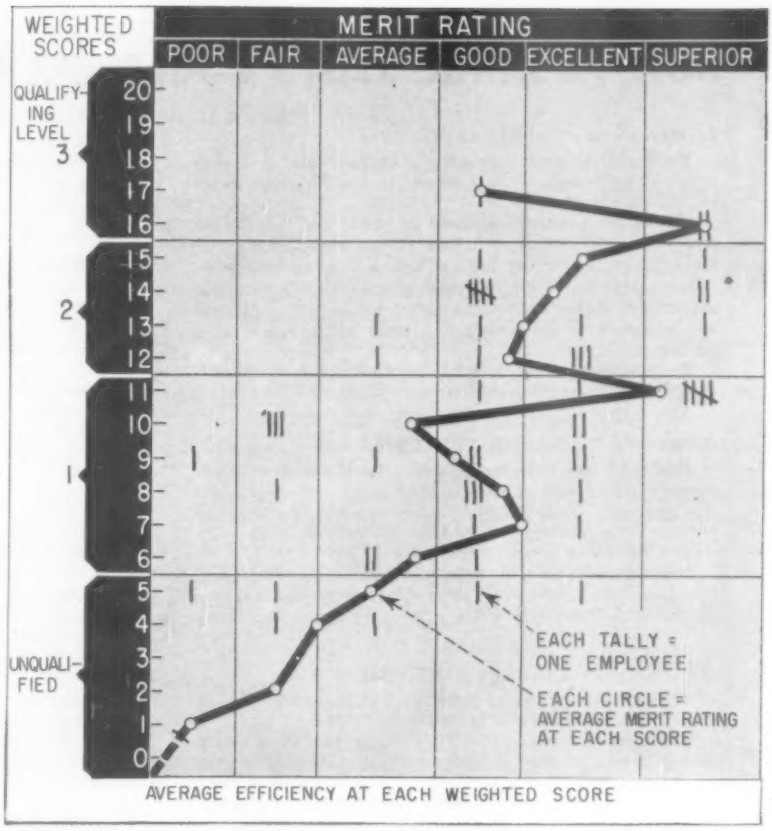
. . . *Testers* may take years to set standards on the basis of new hires.

. . . *Tested employees* (at least 40 of them) will have to stay with your company a long time before you can establish a job-performance record.

. . . *Low scores* can cause trouble. If you hire them, they may fail on the job. But if you don't, half of your sample is missing when the statistics are finally analyzed and the standards set.

ARE PACKAGE TESTS VALID?

If care in development and utilization means anything—and it does—you can depend on package tests. The psychologists who develop the tests and set the standards base the tests, the score weights, and the qualification levels on statistical research studies of successful and unsuccessful applicants and employees in the major job fields. They can show that particular jobs in one company are not greatly different—psychologically—from jobs in the major job fields. This way, they turn out a test that you don't have to validate, tailor, or check out in your own company before you get your program started.



THE HIGHER the cut-off score (using package tests and pre-set standards), the better your chance to get new hires who will earn higher ratings after employment.

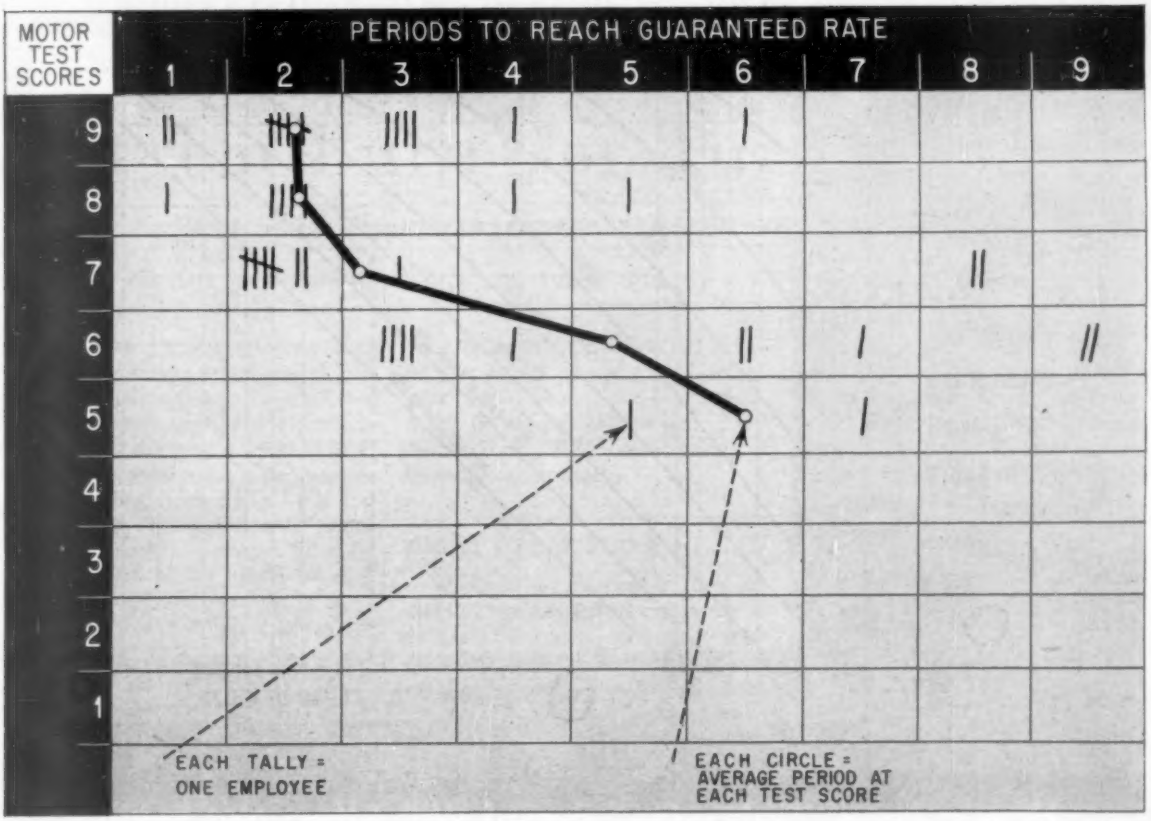
Saving on production—Look at the chart directly above. It shows a study made to check the accuracy of a battery of unskilled-worker tests for selecting female applicants for assembly work in an electronics factory. These tests include measures of tool and mechanical recognition, speed of inspection (perception), coordination, and dexterity. The pre-set standards were used in the original selection of the 57 women in the study.

Job description, provided by the company, read as follows: "Works on or helps assemble various electronic subassemblies. Typical operations include pulling wire ends, dressing wires, applying required insulation, soldering wires and metal parts, and assembling parts with nuts, bolts, and screws. Follows established procedures and works under close supervision in an assigned section of the plant. Requires little or no previous experience."

Merit rating was based on ability to learn, knowledge of job, quantity of work, and quality of work produced. No consideration was given to personal characteristics or potential in the company.

You'll see the six categories of merit-rating efficiency at the top of the chart. The irregular line drawn through the chart indicates average merit rating at each weighted score. On the average, the higher the score, the better the employee's rating.

For hiring future assemblers the company selected a weighted score of 11 points or more as the cut-off. This eliminated 48% of present as-



SHORTER training periods are required by new hires who score well on package dexterity test. By raising cut-off point to higher score you can cut training costs for new workers. High scorers will reach production norms faster.

semblers—mostly the low producers. Result: More intensive recruiting will be needed in the future.

If all employees on this job had met the weighted score standard of 11, there would be a 15% increase above present production. Again, if no increase in production were wanted, a 10% cut in personnel would be possible. This would mean a yearly wage saving of $14,250.

Saving on training—Take another example (chart directly above). It's a study of the motor test (which measures coordination or dexterity) against training time. The test was used in seeking 42 new hires for jobs with a two- to three-month learning period. A score of 5 or higher was required for employment. The question was: Could training time be cut by moving the cut-off score up above 5?

The grid shows number of periods (4 weeks each) it took each of the 42 new hires to reach guaranteed rate. (Company pays new hires at guaranteed rate during training even if production doesn't reach this rate.) The sooner the guaranteed rate is reached the less the company has to pay for training. The chart shows that 3 new hires reached the guaranteed rate in the first period (4 weeks), while 2 new hires required 9 periods (36 weeks).

The 20 new hires who scored 8 and 9 reached the guaranteed rate in 2.6 periods (about 10 weeks) on the average. The 12 who scored 5 and 6 took 5.5 periods (about 22 weeks). For this company, moving the cut-off score from 5 to 7 makes a lot of training-cost sense.

HOW USE PACKAGE TESTS?

Package tests have much in common with other package products—from ready-to-cook meals to do-it-yourself yacht assemblies. You just buy a manual that tells how to run the program, plus packages of tests for various kinds of job applicants.

You may use from 3 to 10 tests. They'll take from 15 to 60 minutes to administer, cost from 60¢ to $2.40 for the forms. The manual will tell you the sequence for giving the tests and will give you a series of checkpoints that show whether the test-taker is making progress.

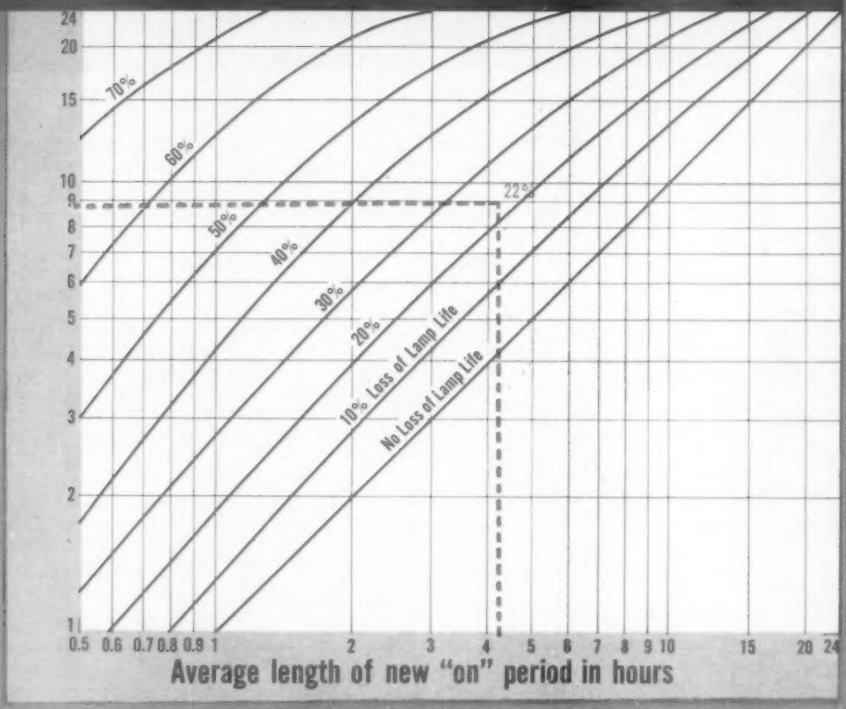
Each test is scored with a cut-out stencil, then weighted in terms of the applicant's job field. For example, you may use the same test for skilled and semi-skilled workers, but the weighting will differ.

Tests are usually set up (along with interviews) as a series of screenings. If the applicant scores low on the first two or three, his chance of working out on the job is slim and you may want to halt his screening right there. If he qualifies for the job field, the strong and weak points revealed by the tests will help place him in the best job.

One more thing to remember: Your company's personnel practices must be in order in terms of training, supervision, and administration even if your workers are well qualified and properly placed.

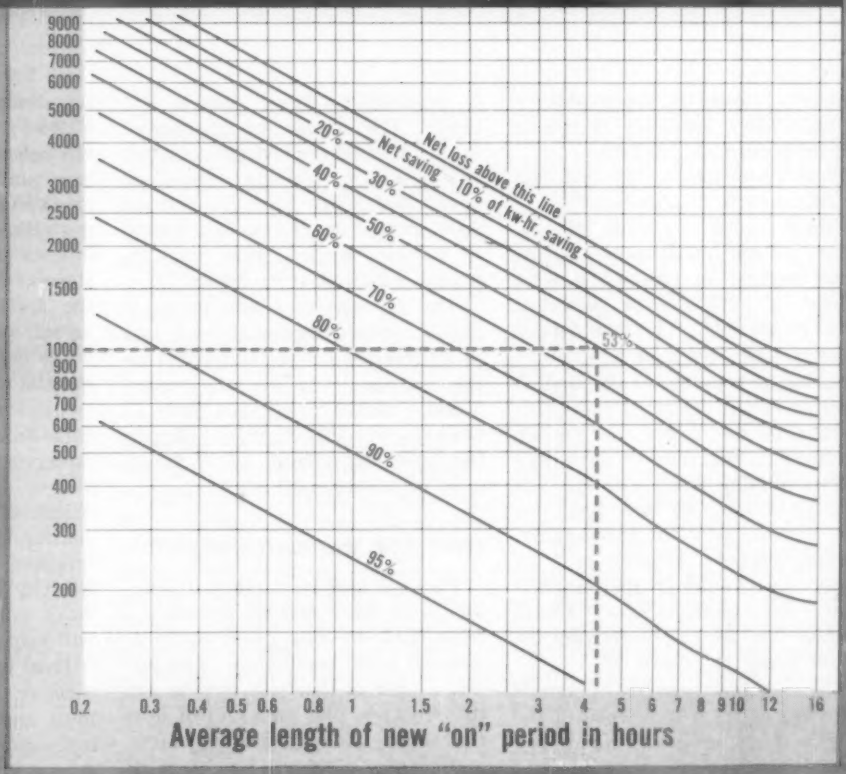
How a Change in "Lights-On" Period Will Affect Lamp Life

Length of old average "on" period in hours



How a New "Lights-On" Period Will Affect Net Savings

Number of "off" periods required before kw-hr. savings will offset lamp-life loss



These new curves will help answer your question:

Let 'em Burn—or Turn 'em Off?

With today's fluorescents your old on-off cycles are out of date—in fact, may be costing you money. Here's a quick and easy way to up-date them.

WILL YOU really save money when you turn out those fluorescents? The curves at left will help you find out. If you haven't studied this problem recently, better give it another look. Why? Because today's fluorescents are different from those of a few years ago. That means a difference in your decisions to leave them on or turn them off for lunch, for shift changes, for plant clean-up.

Here's what's different about today's fluorescents:

. . . *Filaments are more rugged.* They'll last through more starts.

. . . *Brightness lasts longer.* Frequent starts have little effect on it. Better phosphors and conducting gases produce a flatter curve of light output throughout lamp life.

. . . *Quality is more uniform.* Variations between best and poorest lamps are narrower. This makes group replacement more practicable.

. . . *Defective lamps are rarer.* With fewer short-lived lamps, average relamping costs are lower.

WHAT CYCLING DOES

Basis for light and life rating of fluorescents is a three-hour burning cycle under specified conditions and with ballasts that meet ASA and CBM (Certified Ballast Manufacturers) specifications. Improperly designed ballasts substantially reduce lamp life and/or light output.

Take a typical lamp—one rated at 7500 hours on a three-hour burning cycle. On a six-hour cycle it averages 9400 hours; 12-hour cycle, 12,000 hours; continuous burning, 18,750 hours. On the other hand, with a two-hour cycle it averages only 6400 hours; one-hour cycle, 5000 hours; half-hour cycle, 3750 hours (only 20% of capacity if burned continuously).

By TED SARGENT, Assistant Manager
Sylvania Electric Products, Inc.
Salem, Mass.

RIGHT CYCLE FOR YOU

Whether a particular turn-off schedule for any fixture (or group of fixtures) will save money in your plant depends on four factors:

. . . *Cost of power per kilowatt-hour.* Figure this at the price for a kilowatt-hour at the time you turn lights off. (Does it coincide with peak demand, which is a high rate?)

. . . *Cost of relamping.* Consider lamps and labor for the fixtures in question. If lamps are hard to get at—or labor costs high—it may make sense to leave the lights on.

. . . *Wattage per fixture.* Include lamp and ballast wattage at fixture voltage. A typical four-lamp (F40-T12), rapid-start, 120-volt fixture takes 188 watts; a two-lamp slimline (F96-T12), 120-volt fixture, 174 watts. Overvoltage boosts wattage.

. . . *On-off schedules, old and new.* Relationship between them will show if kilowatt-hours saved by turn-off will offset your higher cost of shorter relamping intervals.

Five steps to an answer—Take an example. Suppose you're using four-lamp fixtures. Suppose lamps cost you 91¢ each ($3.64 per fixture); relamping labor, 93¢ (20 minutes per fixture at $2.80 per hour); and power, 1.1¢ per kilowatt-hour. You've been burning lights continuously 9 hours a day. Will it pay you to turn them off for 30 minutes at midday (giving you a new average "on" period of 4¼ hours)?

You can find out in five steps:

1. Go to the upper group of curves opposite, find per cent of lamp life lost. With old average burning period of 9 hours and new average of 4¼ hours, loss is 22%.
2. Multiply relamping cost per fixture ($3.64 for lamps, 93¢ for labor—total $4.57) by 22%, thus get cost of lamp life lost ($1.005).
3. Figure power savings (0.188 kw. for half an hour at 1.1¢ per kilowatt-hour, or 0.103¢ saved for each turn-off period).
4. Divide cost of lamp life lost ($1.005) by power savings per turn-off (0.103¢) to find the number of "off" periods (975) needed to offset cost of lamp life lost.
5. Go to the lower group of curves opposite. The 975-"off"-periods line intersects the 4¼-hour burning period line to show that net savings will be 53% of power-cost savings, or 0.0546¢ per fixture.

RULES TO REMEMBER

If your power rates are average and your labor rates are sky high, or if you don't group-replace your fluorescents, you'll have to leave your lights off at least half an hour before turn-off yields a return. On the other hand, power has to be pretty expensive before you can gain by turning off 24-hour-a-day lights for short periods. Why? Because turn-off makes such a heavy cut in lamp life that the power rate has to be very high to offset it.

A good rule of thumb: If your labor costs are average and you pay from 1 to 3¢ per kilowatt-hour, and if your lights-off period is over 20 min., turn 'em off—but be sure minimum average on-time is 1½ hr.

FREE FILE COPY of this article available while supply lasts. Circle FC-13 on Reader Service Card next to back cover. For complete FC list, see page 200.

Here, in an exclusive FACTORY round-up
60 makers and users of inspection equipment tell
how they're solving today's problems in product
inspection and how they see the problems of tomorrow

INSPECTION TODAY

Where It Stands Now—and Where

"ME BUY ONE of your new inspection gizmos? My customers find enough holes in my castings. Why should I look for them too?" That's what a Midwest manufacturer told an industrial x-ray salesman earlier this year—a year when inspection took another giant step.

Fortunately that manufacturer isn't typical. For all over the land—in job shops, in automated factories, in plants that manufacture foods, rubber goods, appliances, autos, petroleum products, pharmaceuticals, missiles, and thousands of other products—plant operating managers today are grappling with quality demands that force them to excel standards that were way out of reach just a few years ago.

How fast is the pace? What are the pressures behind today's managers? To find out, FACTORY asked 60 key men in a selected cross-section of industry to answer the following questions about inspection today:

. . . *Have you made or installed* any new inspection equipment in the past year?

. . . *What's your estimate* of the emphasis on inspection today compared with what it was five years ago? Why the difference?

. . . *Any trends or developments* you think significant? What are they?

On these six pages you'll find the answers that these 60 key men gave to the questions.

Inspection defined—What is inspection? Not everybody agrees. But one thing is clear: It's becoming more and more difficult to pin down inspection as a separate function. The reason, according to one expert: "The ultimate result of the new inspection is that it will be absorbed in process control in one continuous loop operation." In other words, inspection is now being merged with processing, is losing its traditional separate status.

For process industries inspection is already fading into the produce-test-adjust cycle. Statistical quality control (SQC) is responsible. Elsewhere, inspection means SQC, too. But, as Eugene MacNiece of Permacel-Lepage's, Inc. (New Brunswick, N. J.), points out: "Only 30% of industry is using SQC effectively. And maybe 20% more is using some of the techniques. The last 50% know from nothing."

Where does all this leave us? In 1958, at least, inspection remains the sensing function of the production line. Inspection devices or methods must be sensitive, repeatable, readable (or at least intelligible). And whether plant managers are using devices well or indifferently, one thing is sure: They are not ignoring inspection. If anything, they are giving it more attention.

WHAT THE EXPERTS SAY

Over 90% of the quality-control men polled by FACTORY report an increased emphasis on inspection in the past five years. Almost all think there's much more emphasis on inspection methods, while a few take the more conservative view that there's somewhat more emphasis today than five years ago. None thinks there is less emphasis.

Among manufacturers of inspection equipment the picture is about the same, except that they aren't as willing as the users to commit themselves to the view of greatly increased emphasis. All but one of them do agree, however, that there is more emphasis, with about a third of them saying there is "somewhat more," while two-thirds say "much more." Only one manufacturer thinks there's less emphasis than there was five years ago.

Plant men as well as inspection

By E. W. ZIEGLER, Assistant Editor, and ROBERT S. RICE, Industrial Production Editor, FACTORY

It's Headed

equipment manufacturers show a marked similarity of opinion when they assign reasons for the increasing emphasis on inspection. Here are the two major pressures they consider the most significant:

Reliability—Specifications are tightening in response to continuing demands for more reliable products. The best of 10 years ago just isn't good enough today.

Competition—The buyer sits plump in the driver's seat. If you can't give him what he wants, he will find someone who can.

BUILDING RELIABILITY

Here's a typical comment from one quality control man: "The complexity of our work has increased five-fold in five years," says Raymond Hermann, chief inspector at Ford Instrument Division of Sperry-Rand Corporation (Long Island City, N.Y.). "Today it's not unusual for us to work to a 30-millionth."

A Midwest machine-shop quality-control supervisor puts it this way: "We are required to do much more complicated machining of our products today, and our inspection methods have to improve to help provide this precision."

Al Lubow, quality control analysis

How Today's Trends and Tomorrow's Needs in Inspection Look to . . .

. . . Users of Inspection Equipment

- A higher degree of standardization in specifications, requiring more precise and reliable inspection equipment.
- Far wider application of statistical quality control.
- More thorough indoctrination of operators in the need for quality.
- Increasing use of ultrasonics as a testing technique.
- Growing reliance on radioactive tracers.
- More continuous monitoring with radioactive isotope gages.
- Replacement of wet chemical testing methods with physical tests.
- Increasingly severe tests and testing techniques.
- Continuous checking of machines and assembly lines by roving quality-control inspectors.
- Growing demand for non-destructive testing.

. . . and Makers of Inspection Equipment

- Increasing demand for equipment with "almost impossible accuracy."
- Far wider reliance on in-process inspection.
- Growing application of statistical quality control.
- Increasing reliance on optical inspection during manufacturing operations.
- More inspection right at the machine tool as a standard procedure.
- More automation of inspection through electronics and optics.
- Wider application of radioactive isotopes for continuous non-destructive testing.
- More instruments for continuously recording gloss, color, and reflectance of papers, plastics.
- More precise confirmation of theoretical data by actual operation.
- More portable x-ray machines.
- Growing automation for assembly and final inspection.

Begins on page 96

"Customers are constantly increasing their demands

chief at North American Aviation (Los Angeles) says: "Component complexity is increasing to such a point that we need both new equipment and new techniques. The reliability factor in high-speed aircraft is now calculated to a finer degree than ever before . . . It's going to take more detailed inspection to guarantee that we have what the designer intended us to have."

Standard Pressed Steel Company points out the reasons for the explosive growth in emphasis on reliability. If you have 10 critical components in a product, 99.0% reliability in each component will yield only 90.44% over-all reliability. Now take a hulking missile with 100,000 parts, each of which is 99.0% reliable. It's conceivable that less than 1% of those missiles will get off the ground; even with 99.999% reliability per component, the percentage of good missiles is a lame 39.81.

The company's booklet, "High Reliability," points out: "Reliability is no longer the province of the missile maker alone. Take the factors of competition and safety. With 5-billion critical connections in the autos and trucks on our highways, there's more chance of trouble. Merely to hold the line on road safety we need greater mechanical reliabilities."

WRESTLING COMPETITION

A good example of what competition is doing to industry in general is provided by the food industry. Birds Eye Foods Division of General Foods Corporation (in the person of Lowell Kruse, chief engineer) reports that competition is so fierce that many small producers are selling at below cost to chain-store buyers in a last-ditch fight for survival. Large chains can dictate quality and price to smaller suppliers. Nothing but the best will do. But producing—and assuring—the best can be a ruinously expensive job for the manufacturer who is ill-equipped.

This view of tightening competitive pressures is confirmed by a large meat producer in the Midwest. Says the company's quality-control manager: "The food business has changed. It requires a new approach. Now we are dealing with chain buyers who use statistical screening on their end. We're forced to build quality in."

Sure, the food industry is extremely competitive. But other industries also are feeling greater and greater competitive pressures—facing customers who are well versed in what's available and insistent on the very best.

"Customers are constantly increasing their demands for quality," says Milton R. Weiss, chief of quality control for Alco Valve Company (St. Louis). "We try to be sure our products meet quality standards when they're made. We don't check completely every item that goes out, but we have enough checks to determine quality."

An Ohio metal fabricator notes that customers have greater technical knowledge than ever. This means the buyer knows precisely what specifications he needs.

Some other examples: Ford Motor Company (Detroit) has teams of inspectors who put themselves in the shoes of consumers, probe every component that the consumer can't see or evaluate on the showroom floor. Then the inspectors assign a numerical rating to each component. Ramsey Corporation (St. Louis) is using a new device to assign number ratings to the smoothness of casting surfaces.

For Ford, Ramsey, and many another company, competition threatens to turn unreliability into a competitive nightmare. Take Company X, a large electrical manufacturer. Despite an inspection routine on fluorescent light ballasts that seemed to provide dependable quality data, the ballasts overheated and began to drip on furniture, draperies, and rugs. Test results indicated the insulating compound in the ballast was all right—but the tests themselves weren't reliable. Company X paid out a huge sum of money (one source says $8-million) to soothe outraged customers. The cost far exceeded that of installing an airtight inspection routine.

GIANT STEP IN '58

Among the makers and users of inspection and test equipment who replied to FACTORY's questionnaire, most built or bought new equipment during the past year. Among the makers, all but one offered new equipment during the year. Among the users, 72% did install new equipment, 28% didn't.

That shows industry isn't just talking when it says the emphasis on inspection is booming. Ford Instrument's Herman puts his finger right on one reason when he says: "It isn't enough any more to find out if a piece is good or bad. We have to record how good or bad."

Alcoa's chief of statistical analysis, William P. Goepfert, hits another major reason. "Obviously, he says, "it's more economical to point our efforts toward the prevention of defects than toward weeding out bad products after they have gone through a number of costly production steps."

PROJECTING THE TRENDS

What of the future? FACTORY's respondents say there's going to be more inspection, better inspection, and higher quality. We've seen that tighter specifications and tougher competition are the pressures plant men feel most. But is there some unifying pressure behind these? Maybe so. Maybe the pressure goes back to the attitude of the potential consumer of the final product. The idea comes from Harvard's professor of economics, John Kenneth Galbraith. Galbraith's new book on the American economy, *The Affluent Society*, indicates that because America today is a richer land than the world has ever seen, mere production of goods no longer interests consumers. The new consumer wants quality.

More from workers—If the attitude of the ultimate consumer is important, no less important is that of the plant worker. Observing this development, a western pharmaceutical laboratory says: "The greatest emphasis is on the quality attitude of our employees."

for better quality in the products they buy"

The mere presence of an inspection device in a plant may have a powerful effect on employee attitude, according to evidence from Akron tire plants. Richard Landis, General Electric's x-ray sales manager in Chicago, reports that tire workers (whose operations are largely by hand) began turning out higher-quality tires shortly after installation of x-ray equipment—just its presence had an effect.

More for inspectors—Another development is the new freedom being given test-inspection engineers. They are becoming censor-arbiters of the production line. Milton R. Weiss, chief of quality control at Alco Valve Company (St. Louis), says: "Our quality control people are getting more independent of the production department. It's becoming a practice for companies to lean more on the quality control man to verify quality."

INSPECTION FOR '68

In its survey FACTORY also went to leading professional authorities on inspection to find out what they thought the major trends are. Here is what author-consultant J. M. Juran has to say: "The mechanical industries are beginning to narrow the gap between antiquated inspection methods and the new, integrated inspection systems of the process industries." He lists new techniques that are beginning to catch on in the field:

. . . *Sampling teamed up* with feedback of inspection and test data to production to get away from 100% test and inspection.

. . . *Automating of inspection where* 100% seems inevitable.

. . . *Planning of inspection activities* by quality control engineers, not inspection supervisors.

. . . *Planning and training* for inspection, promoted by increasing use of inspection and test manuals.

. . . *Engineering the measurement system* along with the production process. This is where the mechanical industries are taking a leaf from process industry's book.

. . . *Sampling* by variables instead of by attributes.

. . . *"Counting-down"* by set-up men and operators as a procedure in assuring quality (i.e., checking everything that can affect quality).

. . . *Developing a wide range* of non-destructive methods of testing.

. . . *Emerging of air and electronic gages* (both comparators) as the main tools for precise measurement of length.

. . . *Introducing wide-angle stereomicroscopes* for visual inspection in wake of increased miniaturization.

Approach to the future—The inspection system of 1968 will be the child of infinite patience on the part of the plant operating man. Why? Because, as W. S. Tandler, president of the Warner & Swasey Research Corporation (New York), says: "Industry tries to get by with that which is oldest and most old-fashioned. With all new techniques you need a new attitude."

This is where patience will be a virtue, because, as Tandler sees it, old attitudes are hard to change. "Inspection" he says, "is a nuisance. If, for example, one spends a great deal of effort to inspect a hundred complex parts and finds them perfect in every way, he cannot help but feel frustrated—for he has actually wasted his time. If, on the other hand, one does find faults, he has not wasted his time—yet he feels frustrated in another way."

What, then, if the inspection system is automated? Eugene MacNiece (Permacel-Lepage's) suggests that this situation, too, is full of potential grief: "In designing a new system you must figure how often you want it to work. Otherwise it goes hunting here, hunting there. Wears itself out—goes crazy. You want it to operate as infrequently as possible, yet give you reliability. That's where SQC is eliminating complete inspection and making it possible to screen only."

DREAMING UP ANSWERS

The new inspection will take men with free-wheeling imagination. New equipment and new techniques are changing so fast that a man must be fast to change, quick to learn. New equipment and methods are also bringing a new sophistication to plant operators. Maynard S. Renner, of the Dewey & Almy Chemical Division of W. R. Grace & Company (Cambridge, Mass.), says:

"We are measuring things that operating men only a few years ago didn't know existed. And new devices provide ways of getting data to establish without question the existence of these quality characteristics or variations and thus obtain better controls."

There is no equipment commercially available for many specialized inspection jobs, so companies often have to build their own. A spokesman for the System Division of Hughes Aircraft Company (Los Angeles) reports that 30% of floor space in Hughes' assembly areas is devoted to test and inspection. The company develops and builds over 100 new pieces of test equipment every year—much of it right into the assembly lines to check each subassembly immediately after completion.

Hughes also has a Test Equipment Development Laboratory for production only. It's been in existence some five years, but already is credited with spurring the development of more accurate inspection techniques in an industry that's way out front in accuracy needs.

Hughes isn't alone. Other companies, too, report inspection devices they have built themselves. Here's a random listing, by no means complete, of devices that respondents in FACTORY's survey have installed in the past year:

. . . *Lead checker* to measure lead error in a thread grinder.

. . . *Ply separator and pliability tester* to determine pliability of paper products.

. . . *Needle testing device* with special magnification attachment.

. . . *Super-precise microscope for measuring.*

. . . *Special-purpose electronic test systems.*

. . . *Large gages* for auto bodies (in order to make a number of measurements simultaneously).

. . . *High-speed electrical characteristic testing device.*

Turn the page

Begins on page 96

How Today's Equipment Is Solving Problems

How do we stand today in new equipment for inspection?

Pretty well. Look again at the growth in inspection needs and the developments in inspection practices as equipment users and equipment manufacturers see them (p. 97). Then learn from the examples that follow here how both groups are designing, developing, and applying devices and systems to meet today's needs—and tomorrow's.

These examples will show where we're headed in inspection. And how far we've come since the old days Eugene MacNiece (Permacel-Lepage's) remembers. "In those days," says MacNiece, "if a guy wasn't strong enough or smart enough to work a machine, you put him on the inspection bench." Now such reasoning invites calamity.

Now take some examples of what's available today, set them up in a problem-and-solution pattern:

INACCESSIBLE PARTS

Suppose you assemble a product in which lubrication of a hidden bearing (after assembly) is important. How can you be sure each unit has a lubricated bearing?

Solution—Standard Oil Company (Ind.) researchers have developed an instrument system that measures density of an assembly so precisely that the presence or absence of the desired quantity of lubricant registers instantly on a meter.

PRODUCTION-LINE TESTS

Statistical quality control aims to correct deviations from specifications during production. It's responsible for many devices that fit into production processes.

Solutions—Take your pick:

. . . *The Aquatel*. Made by Curtiss-Wright Corporation's Electronics Division. Measures moisture content of in-process paper within ±0.5% Permits continuous checking and adjustment during production, avoids piling up substandard product.

. . . *Consistency regulator*. It measures and controls pulp consistency in paper making. Made by Fischer & Porter Company.

. . . *Integrated system*. Inspection and assembly are integrated in a machine that turns out thousands of tapered roller bearings every day. This machine does many jobs: Gages diameter and flange thickness of inner race to determine correct roller size to be assembled within a given ring. Selects proper size and number of rollers from one of six hoppers. Inserts rollers into cage and adds inner ring. Checks assembly for correct number of rollers and crimps cage. Puts assembly under a revolving load condition and checks torque, standout, noise level. Segregates acceptable and reject bearings. System is made by The Sheffield Corporation.

NON-DESTRUCTIVE TESTS

Today's demand for reliablity requires checks of materials and components for internal defects. This has spurred development of devices for non-destructive testing.

Solutions—You can find a device for almost every need:

. . . *Type B thickness gage*. Measures thickness of paints, enamels, platings, bearing linings, other non-magnetic coatings on magnetic steel parts. Adaptable to thicknesses from 0.0001 to 0.300 inch. Made by General Electric Company.

. . . *Ferroflux*. This new portable (23-lb.) magnetic device detects surface and subsurface defects in ferromagnetic materials. Made by Ferro Machine & Tool Company.

. . . *Sonizon SO-200 direct-reading ultrasonic testing unit*. Made by Magnaflux Corporation. It measures thickness from one side and checks hidden bonds between two metals or a metal and a non-metal.

. . . *Magnaglo materials*. Used with the wet method of magnetic particle inspection. Under black light they glow, indicating surface and internal flaws. Used for inspection at any stage of manufacture. Made by Magnaflux Corporation.

. . . *Atomonitor*. Uses radioactivity to inspect assemblies for presence of hidden vital parts—parts that can't be felt or seen when assembly is complete. Parts to be checked are plated with radioactive material before assembly. Maker: Nuclear Corporation of America.

. . . *Ultrasonic testers*. Measure a wide range of thicknesses from one surface, where thickness can't be measured without cutting into product. Also detect internal flaws. Maker: Sperry Products, Inc.

. . . *Portable x-ray*. Provides non-destructive inspection of parts in production. Eliminates need to move parts to x-ray room. Made by Balteau Electric Corporation.

CONTROL OF VARIABLES

Metal technology is discovering new cause-and-effect relations between processing and the properties of metals. For each new variable that's identified, new instruments must be devised to measure or control the variable in production.

Solution—Here's one example:

. . . *Gas Analyzer*. It's made by Serfass Corporation for Fisher Scientific Company. It measures hydrogen, oxygen, and nitrogen in metals in accuracies to ±0.2 ppm. Does it quickly enough to use results to control production.

RIGID SPECIFICATIONS

The spread of standardized specifications creates problems in inspection as well as production. Customers are getting fussy about variations that once were accepted as normal. For example, color precision often goes beyond the ability of the human eye to compare product with sample. Other critical factors: transparency, opacity.

Solutions—These, for instance:

. . . *ASTM Colorimeter*. Made by Fisher Scientific Company. Measures color of petroleum products against ASTM color scale. For the first time, colors of petroleum products can be specified in terms of fundamental, uniform standards.

. . . *Spectronic "20" spectrophotometer*. Made by Bausch & Lomb Optical Company. It analyzes colors of paints, textiles, plastics, inks, dyes, glass, tile, etc. Provides accurate readings in per cent reflectance. Used in shop or laboratory, or carried between them.

. . . *Automatic photometric unit.* A basic device for measuring surface qualities. With one of a variety of exposure heads it can be used for automatic measurement of gloss, haze, transmittance, goniophotometry, reflectance, color. Made by Gardner Laboratory, Inc.

HIGH-HEAT HARDNESS

Suppose you make a part (maybe for a missile) with a hardness specification at 1200 F.

Solution—American Chain & Cable markets a Rockwell tester that measures hardness up to 1500 F.

CLOSER TOLERANCES

New and better devices are needed today to perform the once simple act of measuring. Tolerances down to 0.0001 inch are hard to measure accurately and repeatedly.

Solutions—There are several:

. . . *Convertible thimble micrometer.* This new product of Brown & Sharpe Manufacturing Company is an example of the way closer tolerances are affecting measurement. Its features include convertibility to friction or fixed type, oblique graduations for better reading, one-hand miking and locking, carbide measuring faces for long wear, and reading to 0.0001 inch.

. . . *Direct-reading cylindrical square.* It measures, within 0.0001 inch, the deviation from squareness of products up to 6 inches high. Measurements are read directly on the 6¼x2½-in. diameter cylinder. Also made by Brown & Sharpe.

. . . *Extended range optical comparator.* Made by Jones & Lamson Machine Company, has a 30-in. diameter screen for optical checking of larger parts. Measuring capacity, to 0.0001 inch, is 10 inches horizontally, 8 inches vertically, 360 degrees angularly to 1-min. vernier. Measures complex parts quickly.

. . . *Contour transcriber.* Makes a permanent record, on coated glass, of contours of master patterns, models, molds, dies, etc. Contour traces are measured on conventional contour projectors. Handles contours up to 8x18 inches. Manufactured by Optical Gaging Products.

. . . *Hole coordinate measuring machine.* Enables an inspector to determine precise location of holes or center distance from a common reference point quickly, easily, and with great accuracy. It indicates true location of holes regardless of diameter tolerance. One standard model checks hole center distances up to 6x6 inches. Another checks an area up to 10x10 inches. Made by The Sheffield Corporation.

. . . *Moisture monitor.* This portable device measures moisture content of air and gaseous mixtures, detects moisture in quantities even less than 1 ppm. Made by Consolidated Electrodynamics Corporation.

. . . *Hyge shock tester.* It will measure shock resistance in terms of thrust (tons), acceleration (rates many times gravity), and time (milliseconds). Can complete a test in 30 seconds, repeat it consistently, often. Manufacturer: Consolidated Electrodynamics Corporation.

. . . *Halogen-type leak detector.* It's made by General Electric Company (Instrument Division), comes in four types (gun, pencil-probe, stationary, vacuum) with one standard control unit. It's portable, measures large and small leaks, will check any product in which freedom from leaks is important.

PRECISION, SPEED

Do inspection labor costs have to keep rising? Can inspectors work with consistent precision—unmoved by distractions or fatigue? Can they keep up with high-volume production when 100% inspection is a "must"? Those are tough problems.

Solutions—There are several:

. . . *Valve inspection machine.* It's electronically operated. It automatically checks concentricity, length, head thickness, stem and groove diameter, and groove location in auto engine valves at rate of 3000 valves per hour. Sorts valves after checking. Has tolerance capability of 0.000005 inch. Made by Industrial Electronic Products, Radio Corporation of America.

. . . *Automatic dimension recorder.* This digital print-out system for air and electronic gages automatically prints deviation from nominal size of single and multiple dimensions. It will furnish an inspection report for each part. Maker: The Sheffield Corporation.

. . . *Probomat.* This is a tape-controlled discrete positioning system. It controls processes and can be used for automatic inspection. A measuring probe is positioned (by information on a tape) at a point where measuring contact should be made with the part being inspected. It records this point on a chart, then records contact point. Distance between the two points on the chart indicates deviation from specification. Made by Warner & Swasey Research Corporation.

MINIATURIZATION

Miniaturization has spread so widely in recent years that many plants have to inspect tiny parts. Checking requires measurement of small tolerances, small dimensions.

Solution—Many new devices have been developed. Take two of them:

. . . *Race-to-face gage.* Measures bearings of about 0.047-to 0.125-in. width to a few millionths. Specifically, it measures the parallel of outer face and ball raceway of miniature bearings. Made by Pratt & Whitney Company, Inc.

. . . *"Cycloptic" microscope.* Gives better vision for miniature parts inspection. Instrument Division, American Optical, makes it.

You'll get more help...

. . . on quality control in the following articles from previous issues of FACTORY. Reprints of some (noted below, with prices) are available from FACTORY Reader Service, 330 W. 42nd St., New York 36. Order reprints by code number.

"New Approach to Quality Control," March 1957. Reprinted (Code No. R-7; price 50¢).

"Better Quality—Plus $200,000," April 1956.

"Nine Steps to Better Quality," March 1954. Reprinted (Code No. R-8; price 35¢).

Now—Lighting Standards Soar to

Better brace yourself. Because these new recommendations, based on the facts of vision, call for two, three, even four times as much light for plant jobs.

YOU THINK the lighting in your plant is OK? Then look at the new industrial lighting standards just announced by the Illuminating Engineering Society (panel, facing page). Their meaning for you: Unless your plant's lighting is well above old IES standards—and close to the new ones—your workers aren't getting enough light to do their best work.

IES adopted these new standards after it studied the findings of Dr. H. Richard Blackwell (photo), director, Vision Research Laboratories, University of Michigan. His studies—and those of his staff—span the last eight years. He and his associates probed some significant questions for plant operating management. For example: How much light does a man need to do a job? What happens if there's not enough light? If you improve contrast, can you cut lighting levels? Do operators need more light if the work is moving? How does glare affect light levels?

Dr. Blackwell made public his findings—and the answers to these and other questions—at the August conference of IES at Toronto. The implications: revolutionary changes in plant lighting. So revolutionary that plant operating men are entitled to know the why's and how's of Dr. Blackwell's studies before launching a costly relighting program.

And that's why Jerry Quinn, FACTORY's electrical services editor, sought out Dr. Blackwell for the exclusive interview below. Face to face, Jerry asked the questions (black-face type) and Dr. Blackwell gave his answers.

What's the relation between your lab studies, Dr. Blackwell, and the new IES recommendations?

At our lab we set up 56 seeing tasks that were representative of a wide variety of jobs. We viewed these through a device we developed. We call it the Visual Task Evaluator (V.T.E.).

With the V.T.E. we can reduce the contrast on a defect in a piece of timber, for example, placing over the image more and more veiling brightness until details are washed out and the defect reaches the threshold of invisibility. Then inside the V.T.E. a small, disk-shaped target is brought into the field of vision and reduced in contrast under the same conditions. We then have a direct comparison between contrasts needed for seeing under identical lighting conditions for any given task.

After studying these 56 tasks we set up five categories of difficulty based on the amount of light needed to do them to the same level of performance. We then listed the tasks in each category, believing that lighting engineers could determine from experience which of the categories other tasks would fall into. We were trying to get maximum utility out of the data, but to keep anybody from making too literal use of any one part of it.

The University of Michigan publishes scientific reports from our lab, and IES can use the information as it sees fit. We have no responsibility for what IES does with it. But we don't disagree with what IES is doing with it.

What has IES done with the data?

Its technical committees modified our findings with known correction factors, came up with required footcandle levels for the 56 tasks. For obvious reasons many values in the IES tables represent compromises that weigh economics, practicality, aesthetic values, safety, experience. Where levels for any task (such as inspection) are too high for over-all lighting, IES recommends local illumination. We may be seeing more and more supplemental lighting.

Are there cases where IES calls for levels above yours?

A few. For instance, easy jobs like reading black print on white paper. The values we quoted were very low—lower than people are using right now. IES felt that since existing levels are satisfactory it would be unwise to reduce them.

Also you usually have mixtures of visual tasks—some hard, some easy—in the same room. But you can't change the lighting every time a hard task has to be done. Yet you mustn't have the light level too low in a room, because the difference between room luminance and window luminance is uncomfortable.

Does everybody have the same need for light, same ability to see?

No. In our experiments we used college-age students with normal vision. We found there is little variation in visual assimilation ability among persons with normal eyesight in this age group. Then we spot-checked our results against a much

"The levels specified in our report are those the eye needs to do the job rapidly and accurately," says Dr. Blackwell.

a New High

larger group of the same age, also with normal vision. Older people in general need more light to do the same job.

The average plant today is operating at lighting levels well below old IES standards. Now you're recommending two, three, even four times as much light for many jobs. Yet workers seldom complain about not having enough light. How come?

Let's get this clear: I don't recommend any particular foot-candle levels. IES estimates the average lighting values needed to get so much light at the job. That's IES's responsibility. All I'm saying is that the levels specified in our reports are those the eye needs to do the job rapidly and accurately.

Do the IES levels take into account the frequency with which the most difficult job must be done?

I believe they're based on light needed to do the most difficult commonly encountered job. We couldn't weight our specific findings for frequency. After all, some infrequent tasks are very important. Only by considering everything can a plant manager decide whether to make the difficult job easier by improving contrast, going to higher-level local lighting, or slowing down the speed required for seeing.

Can you get by with less light by slowing down this seeing time?

Time isn't nearly as critical as contrast. For example, if you wish to see something in one fixational pause, or to allow the eye five fixational pauses, the benefit from the extra time is by no means 4 to 1. Going from one to five might compare with a contrast change of no more than

How You'll Have to Boost Your Plant Lighting

Typical Industrial Areas	Foot-Candles for Acceptable Plant Lighting: Old Standard	New Standard
Electrical testing	50	100
Foundry pouring floor	10	50
Structural steel fabrication	10	50
Machine-shop, rough work	20	50
Machine-shop, medium work	50	100
Wrapping, packing, labeling areas	—	50
Sheet metal: shearing, stamping, spinning	20	50
Assembly areas: medium	50	100
Assembly areas: extra fine	300	1000
Cotton mill: slubbing, roving, spinning	20	50
Silk and synthetic weaving area	30	100
Woolen weaving (colored)	80	200
Furniture upholstery floor	30	100
Welding floor	30	50
Painting areas: dipping, spraying	20	50
Hospital: emergency area	50	100
Offices: accounting, tabulating, rough draft	50	150
Offices: mail sorting, active filing, regular office work	30	100
Offices: detail drafting	50	200

Areas Needing Supplemental Lighting	Foot-Candles for Acceptable Plant Lighting: Old Standard	New Standard
Canned food inspection	150	200
Cloth products inspection	300	2000
Sewing areas	200	500
Machine shop: fine work	100	500
Rubber: tire, tube, final inspection	50	200
Sheet metal scribing	100	200
Woolen textile inspection	300	2000
Leather: shoe cutting, marking, stitching	20	300

20%. It takes a lot of slowing down to make up for a small amount of contrast loss.

Are there not environment problems that need attention more than lighting? Noise control? Bad temperature control? Dust and fumes?

People at the Michigan Institute of Industrial Health with whom I've been working believe that visual problems are just as pressing as noise and toxicity. But there's one big difference: As far as we know, people don't suffer physiological damage from dim light.

Has any legislative group approached you seeking to set up new minimum levels based on your findings?

No. Frankly, I hope that doesn't happen, because our knowledge is still incomplete. We're trying to make the most intelligent recommendations we can on the basis of what we know right now. Since people aren't hurt by bad lighting and since lighting in this country is really quite good compared to that in many areas in the world, our findings should be considered advisory, not compulsory. We need more research before we can be dogmatic.

In reality you're specifying optimum levels for visual assimilation, not minimum comfort levels.

Right. We haven't tried to measure comfort. But, all the same, I suspect our levels are far above minimum comfort levels.

The fact is, people aren't aware they need four or five times as much light to do a top job. They're probably bothered more by bad quality of light than by too little. By bad quality I mean glare sources and non-uniformity in luminance. These are objectionable—and hard to control. In a sense, our recommendations represent goals.

Then your results are too preliminary for plants to start making changes based on the new IES levels?

By no means. If a plant manager is willing to try more light to see if it gives better results, I'd certainly encourage him to do so. But to make it mandatory is quite another matter. Some marginal plants certainly wouldn't be able to make this shift.

What good does it do to provide workers with optimum light when so many homes are poorly lighted for reading, eating, or watching TV?

The factory manager needn't worry about that. You see, we have no evidence that inadequate light damages the eye. It just reduces the ability of the eye to see at that particular time.

But we were taught as children that if we read without enough light we would have to wear glasses because of eyestrain.

There's no medical basis for this theory. If we can ignore discomfort caused by glare, flicker, or bad light distribution, the basic reason for giving workers enough light is that it helps them give top visual performance.

Some of the new IES levels are so high that heat from lamps and ballasts will make air conditioning necessary. Any comment?

Only that you'd better make the visual task easy if you can't afford the cost of the necessary light.

How about high-level lighting the worker can turn on only as needed?

Might be worth exploring. Of course, any change in light level means delay and discomfort while the eyes adjust themselves. And changing light levels might distract other workers, too.

Is there any relationship between reduced contrast and the increase in light needed to offset it?

Not a linear relationship. But we can make the conversion. A very small loss in contrast produces need for an enormous increase in lighting. For example, a 13% drop in contrast at a level of about 60 footcandles requires a 200% increase in light level to compensate.

Usually it's impossible to increase contrast. On the other hand, it's occasionally easy. For example, using ballpoint pens instead of pencils. Or using white lettering on dark background. Or cleaning up the fuzziness of reading materials. (Fuzziness is not poor contrast, but it has the same effect.)

How does glare affect light levels?

Glare is hard to evaluate. We do know that reflected glare cuts contrast, because you have in effect an image of a poorly designed or mounted light source smack on top of what you're trying to see.

The study of glare is essentially subjective. You have to get an opinion from people on whether glare bothers them. And you get results that often vary. So you work for averages. That's why we wanted only objective results—just to run experiments, automatically score responses, and then grind the data out. We eliminated glare from our tests purposely. Our test observer's booth was lighted without glare.

Engineers have a big problem with glare because the higher the luminance (and that's the direction we're moving in), the greater the glare. Glare reduces contrast on some jobs tremendously—that in turn means more light is needed.

How can a plant employment department check glare sensitivity in prospective employees?

This is a new field. Right now there's no routine way to measure glare sensitivity. But the Germans have developed some instrumentation for use on night drivers. They call it the Niktometer. Something like it probably could be developed for testing sensitivity to glare in inside lighting.

Can't a plant with a competent engineer or lighting specialist on its staff measure its own tasks right on the job instead of relying on IES levels?

I would think so. But up to now the problem has been instrumentation. Our V.T.E. at present is a lab instrument. But we're working on a portable unit that will make the same tests right on the job.

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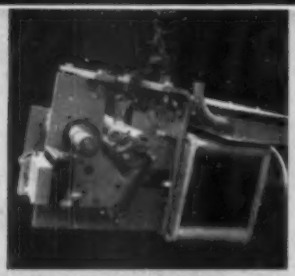

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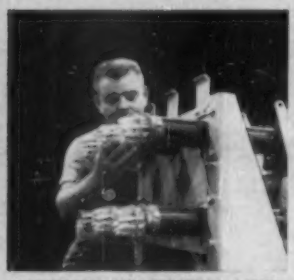

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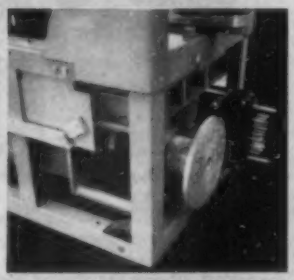

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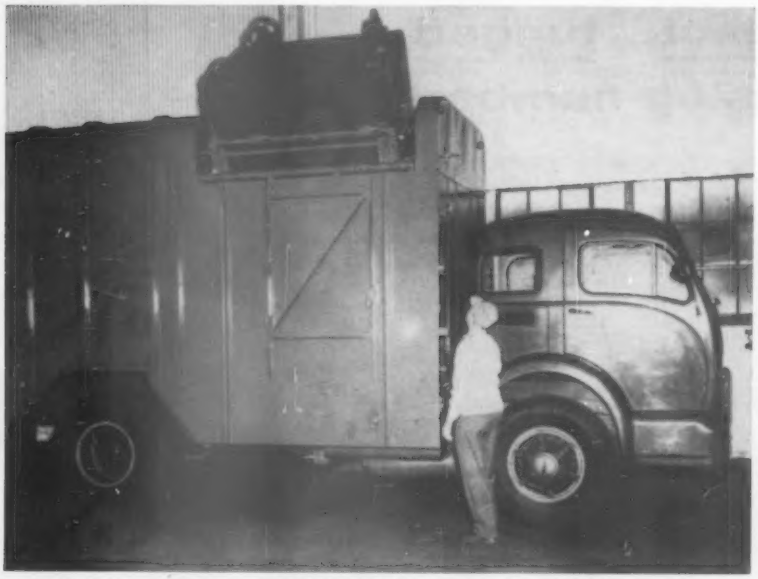


FROM SMALL CART, TRASH DUMPS INTO BIG TRUCK IN NEW . . .

Integrated Trash Pick-Up System

Simple mechanical pick-up system reduces trash handling time while improving plant sanitation and fire safety. The quick-operating, three-component system utilizes an hydraulically operated compacting unit mounted on the truck chassis; an automatic lift-and-dump mechanism; and movable metal containers, called "Trashtainers." The individual Trashtainer units, on wheels, collect refuse at stations throughout the plant. The Trashtainers are of leak-proof, corrosion-resistant steel construction: They have hinged lids to keep vermin out, and a latch that quickly attaches to special lift arms that lift container over truck side, and dump it. One man can operate the entire system by pushbuttons.

Trashtainer units are available in 1- and 2-cu. yd. capacities. Capacity of the truck dump body, when fully compacted, averages more than 60 yd.

Equipment Mfg., Inc. (Circle 101, Reader Service Card.)

102—"Sky Duster" Tool cleans walls, ceilings, stairwells, and other hard-to-reach areas up to 100 ft. high—without ladders or scaffolds. Tool consists of a wool duster attached to removable 5-ft. sections of telescoping lightweight metal poles. *Parlee Co., Inc.*

103—Self-Inking Stencil Roller eliminates use of an inking pad because ink supply is contained in the squeezable plastic bottle which serves as a handle. Ink is distributed evenly on varied surfaces by a micro-cell rubber roller. *Diagraph-Bradley Industries, Inc.*

104—Cutter-Crimper Unit cuts packing and shipping costs. Cutter converts salvage cardboard and corrugated cartons into multi-size sheets for packing; crimper processes the cut sheets into pliable crimped corrugated wrapping and packaging material. *Comptometer Corp.*

105—Small-Size Radio Transmitter (under 3 lb.) makes quick contact with a tiny 12-oz. transistorized pocket receiver that may be carried by a man on foot taking stock inventory or supervising maintenance. Units operate on 25-54 or 144-174 mc. *Motorola, Inc.*

106—Weatherproof A-C Motor that resists drenching is designed for pump, fan, other applications calling for constant exposure to moisture-laden atmospheres. Insulated with silicone, glass-mica, oil-and-water-resistant varnish. *Reliance Electric & Engineering Co.*

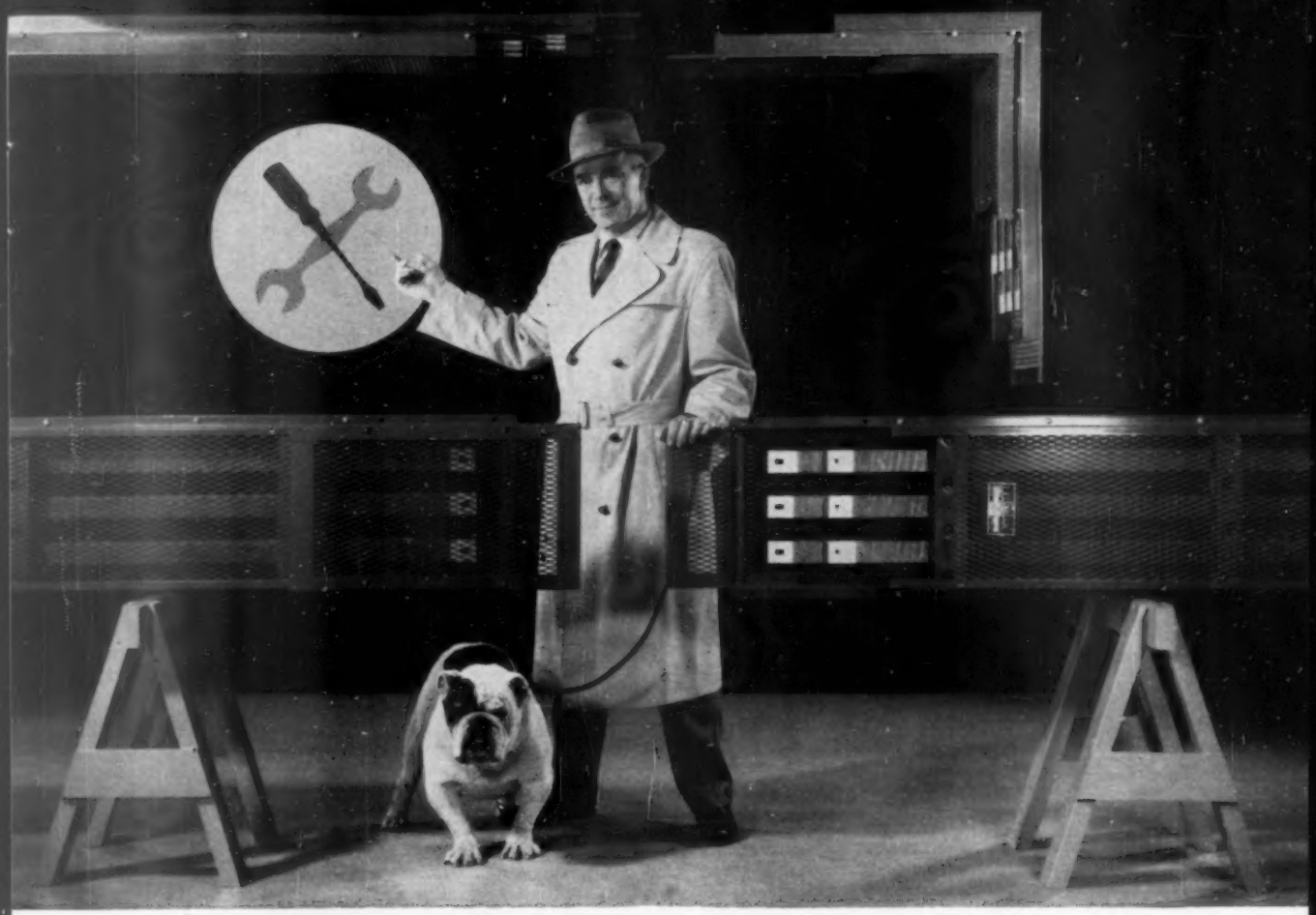
107—"Transeye" is said to be the first transistorized photoelectric relay for heavy industrial service. New tubeless unit, with its miniature light source and photocell holders, handles 300 operations per min. at 8-ft. lightbeam distance. *General Electric Co.*

108—Painter's Mitt reaches around pipes and contoured surfaces and gets into hard-to-reach places where brush, roller, and spray prove impractical. You slip the pliable lambskin mitt on either hand, load by dipping the painting side lightly into container. *Bestt Rollr Co.*

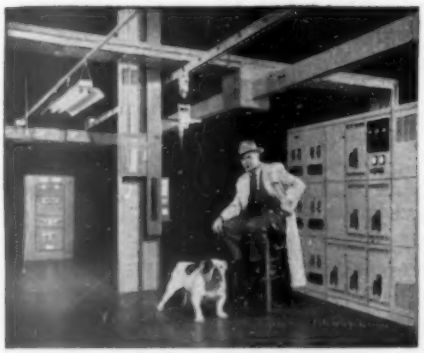
109—Vacuum Barrel Handler unit attaches to fork lift truck and lifts four 55-gal. steel drums, each weighing 490 lb. Dashboard control allows operator to lift or release any combination of barrels. Power unit operates off truck's hydraulic system. *Vac-U-Lift Co.*

110—Portable Pneumatic Conveyor provides rapid movement and recovery of such materials as rock granules; plastic pellets; dry, gritty substances; corrosive chemicals. Two standard models can be used as vacuum cleaners when not conveying. *U.S. Hoffman Machinery Corp.*

Turn the page



Aluminum Lo-X®—*easy to install, economical, efficient*



VERSATILE ALUMINUM Lo-X combines with BullDog Plug-in-Duct, power panels, substations, Trol-E-Duct®, switchboards, safety switches and Electri-Centers® to form a coordinated distribution system that delivers power when and where you need it.

Our field engineer explains how easily Lo-X BUStribution® duct installs. All Lo-X bus sections have rigid scarf-lap joints which can be connected with just a wrench and screw driver. And light aluminum bus bars put less strain on building superstructure.

Even before Aluminum Lo-X is installed you can know what the voltage drop and operating temperature of the feeder system will be. Lo-X saves space, too! It installs edgewise, flatwise, even around corners—is factory prefabricated to fit your building structure.

Look into Lo-X and its partner Plug-in-Duct®. Contact your electrical contractor or BullDog field engineer or write BullDog Electric Products Co., Detroit 32, Mich. © BEPCO

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

HEAT BETTER ELECTRICALLY

For more about these items, circle numbers on Reader Service Card next to back cover.

HE'S TESTING THE STATOR OF AN UNDERWATER MOTOR. IT'S A . . .

Motor That Bathes While It Works

New "wet" motor is designed for use under water—allowing the insulation, windings, bearing, and magnetic components to be totally immersed. A special insulation system using irradiated polyethylene protects the motor's windings during underwater operation.

Several typical industrial applications for the motor are indicated: sewage pump drive motors and integrated pump-motors are two prime examples. Principal advantage of the "wet" motor in these pumping applications is that the need for a pump seal is eliminated—since water from the pump can be circulated through the motor's internal electrical and mechanical components without damage.

Further potential uses include deep wells; additional sewage and nuclear applications. The "wet" motor eliminates breakdowns that would be suffered by conventional insulation systems in such applications.

The "wet" motor functions efficiently in water at pressures as high as 3000 psi. And it can operate in salt water as well as fresh water. Motors of 50 hp. to 350 hp. are currently offered.

General Electric Co. (Circle 111, Reader Service Card.)

112—"Right-Angle-Head" Grinders—1, 1½, and 2-hp. models—feature 3-phase motor that delivers constant speed of 3400 rpm. under load. New electric tools feature 1:1 ratio and service-free design—no brushes, commutator, rotor windings. *Gaston Power Tool Co.*

113—Bulk Shipping Containers, of double-wall corrugated board, hold up to a ton of dry, free-flowing material—as much as forty 50-lb. bags. Square, self-palletized "Pillar-Pacs" are quickly loaded, unloaded, and stacked two-high by fork-lift trucks. *Ohio Boxboard Co.*

114—Portable Heaters with built-in room thermostats can keep workers warm this winter in unheated plant areas—also serve to preheat cold truck engines and to thaw materials left outdoors. Oil-fired units, in six sizes, have outputs to 1-million Btu./hr. *Stow Mfg. Co.*

115—Lube-Line Alert is a protective device for force-feed lubricating systems that's easily installed at each terminal point of lubrication. It monitors lubricant flow—if flow is interrupted, it will activate any signal system you attach. *Houdaille Industries, Inc.*

116—Air Service Package includes everything needed to put together efficient air service assemblies for any airline in the plant. Blow gun has pushbutton control. Nozzle attachments include standard tip, angle tip, long bendable nozzle, duck-bill type. *Weatherhead Co.*

117—Can and Bottle Crushers, hydraulically operated, are said to crush any size can to pancake thinness, glass bottles to rock-salt consistency. Cabinet and portable models plug in any 110-v. outlet, take only a few minutes to operate. *C. G. Metal Products Mfg. Co.*

118—Spray-On Insulation in the form of rigid urethane foam is applied by this new spray gun over large areas or structural panels. Gun sprays the chemical foam on vertical or overhead surfaces, builds up to 2-in. layers on wood, metal, masonry, glass. *DeVilbiss Co.*

119—Low-Cost Hand Stroboscope is a rugged instrument useful for timing fly wheels and balance wheels in machinery, or for timing any constant-speed, continuous-cycle motion. Range of frequencies is 6 to 30 cycles/sec. Price is $3.35 postpaid. *Edmund Scientific Co.*

120—Portable Hand Embosser produces indestructible labels—on-the-spot—for tool cribs, parts bins, wires, cables, and so on. You just dial letter and/or number and squeeze to emboss permanently raised characters on plastic or metal strip. *Roovers-Lotsch Corp.*

Turn the page

LAMSON

pioneers the conquest

OF INNER SPACE

Automatic Airtube Systems

orbit inner space movement at 30 ft. per second

To you the most important form of space travel covers the area enclosed by the walls and ceilings of your plants and offices. Your drawings, samples, tools, small parts, punch cards and correspondence will swing into a 30 feet per second *controlled orbit* when carried by a Lamson Automatic Airtube System. Our carriers select the right destination—whether 10 or 10,000 feet away—with automatic accuracy. And messengers will be released for more productive work.

Whether your inner space is large or small, our complete line of Airtubes and modern, fully integrated package conveyor systems will bring you a material handling network that is out of this world!

Every Lamson system is engineered, built and installed by Lamson. There is *one* responsibility back of the complete job.

The Lamson field engineer in your area would be pleased to study your operation . . . to prove Lamson can contribute to the conquest of *your* inner space. Write us today.

LAMSON

LAMSON CORPORATION • 1003 Lamson Street, Syracuse 1, N. Y.

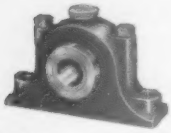
Plants in Syracuse and San Francisco Offices in All Principal Cities

Manufacturers of Airtubes* (Pneumatic Tube Systems) • Integrated Conveying Systems • Pallet Loaders • Selective Vertical Conveyors • Bookveyors* • Clinical History Lifts • Trayveyors® • Food Service Systems • Blowers and Exhausters • Exidust® Central Vacuum Cleaning Systems • Dryset® Air Vacuum Systems • Mobilift® Industrial Trucks

**Trade Mark*

DODGE PRODUCTS you should know

FLEXIDYNE
THE DRY FLUID DRIVE
100% efficiency at full load!



DODGE-TIMKEN
America's Quality Pillow Blocks!

SEALED-LIFE V-BELTS
The life is sealed in!

Write for Bulletins!

- Flexidyne Dry Fluid Drives and Couplings. Bulletin A-640-A.
- Roller Bearings. Load ratings, dimensions, etc. Bulletin A-638.
- Sealed-Life V-Belts. Complete data and sizes. Bulletin A-606-A.

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more about these items, circle numbers on Reader Service Card next to back cover.

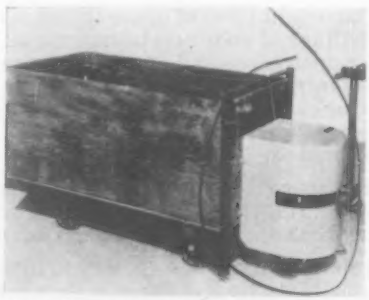
121—Prefab Acoustical Panel Rooms create soundproof areas in noisy plants. They'll keep noise in or out—muffle noisy machinery or segregate precision workers from outside bedlam. These all-metal rooms include a ventilating system. *General Sound Control, Inc.*

122—Swivel Jaw Vise is for clamping irregular workpieces. Back jaw of vise is on a pivot, held in place by a pin for straight clamping action. With pin removed, jaw can be pivoted right or left to lock angular workpieces securely in place. *Wilton Tool Mfg. Co.*

123—Tires with no air in them can't be hurt by nails or go flat. New tubeless, airless tires are made of laminated strips of rubber, reinforced by steel bands. Maker says they'll ride like pneumatics at in-plant speeds on lift trucks, cranes, etc. *Bearcat Tire Co.*

124—Shoplifter that your shop can use is the 2-ft-wide Mark II model, priced under $200. It lifts up to 54 in., has 750-lb. capacity. This weight can be handled safely anywhere on unit's one-piece, back-guarded 24-in.-sq. steel platform. *Economy Engineering Co.*

125—Hose Proof Test Stand, ideal for hose shops with limited assembly and proof test requirements, is a light, portable, low-cost model. Unit weighs 90 lb. dry complete with pump; is suitable for pressures to 10,000 psi., 3/16- to 2-in. hose sizes. *Aeroquip Corp.*



126—"Powr-Wheel," quick-coupled to a fleet of trucks or permanently attached to a hand-propelled vehicle, converts either type of equipment to power propulsion. Forward motion, reverse motion, steering and brake are all in one compact unit. *Vanguard Engineering Co.*

127—Die-Handler is a high-lifting, battery-powered platform truck for moving and storing stamping dies. It will lift 2-ton dies at speeds to 12 fpm. and tier them in storage. Flow regulator in hydraulic system controls platform lowering speed. *Clark Equipment Co.*

128—Electro-Chemical Machining unit enables metal machining to be done from start to finish by electro-chemical action. Process offers accuracy to 0.015 in.; metal removal rates to 300 cu. in. per hr.; relatively low capital investment. *Elox Corp. of Michigan.*

129—Aluminum Platform Truck is light enough to be picked up by a man, yet strong enough to support up to 2000 lb. This truck is available in 32 different sizes ranging from 24x30 in. to 48x72 in. The largest model weighs only 63 lb. *F. H. Langsenkamp Co.*

130—Budget Roller Coater machine is a space-saving model, of steel plate construction, designed to provide uniform application of draw compounds, waxes, sealers, paints, or varnishes on one or both sides of continuous roll or sheet material. *Murray-Way Corp.*

131—Magnetic Conveyor for small ferrous parts takes little floor space, uses permanent non-electric magnets to move the parts. It's available for permanent or portable installations, in 4-, 5-, or 6-ft. heights, and is adjustable from 60 to 90 deg. *Bosworth Mfg. Co.*

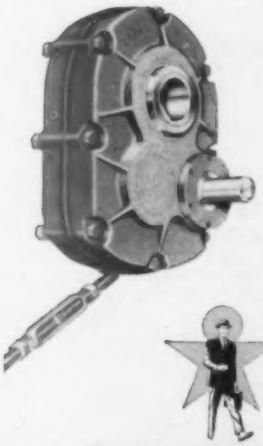
132—Revolving Bin, 65½ in. high overall, has seven revolving disks, each 34 in. dia. Disks, set on ball-bearing assemblies, revolve around center hub in either direction. Boltless adjustable dividers clip in place to partition disks. *Supreme Steel Equipment Corp.*

133—Portable Elevator, electro-hydraulically operated by 12-v. battery system, is capable of a wide variety of work over a long period of service. Standard low-cost model has 64-in. lift, 1500-lb. lift capacity, and its own overnight charger. *West Bend Equipment Corp.*

Turn the page

THERE'S QUALITY IN TORQUE-ARM

...AMERICA'S MOST WIDELY USED SHAFT-MOUNTED SPEED REDUCER



Extreme ruggedness and top quality are built into every detail of the Dodge Torque-Arm Speed Reducer—from the specially heat treated helical steel gears to the corrosion resistant semisteel housing. Broad demand has made it necessary to add sizes until today Torque-Arm is America's most complete (and most widely used) line of shaft-mounted speed reducers. Capacities range from 1 to 100 hp; output speeds from 12 to 378 rpm.

Torque-Arm is mounted on the driven shaft, in any vertical or horizontal position. It is anchored by the torque-arm fastened to any fixed object. No need for foundation, flexible coupling, sliding base. No lining up difficulties. The unit is driven through any V-belt drive. Savings up to 1/3 are possible and Torque-Arm's efficiency is high. It delivers 97% efficiency in double reduction models; and almost 99% in single!

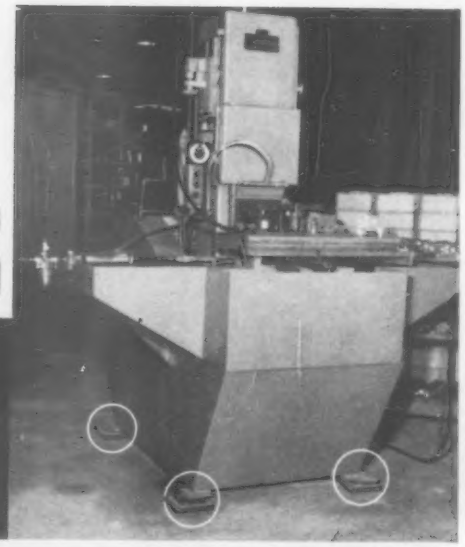
Ask you local Dodge Distributor—or write us for bulletin.

DODGE MANUFACTURING CORPORATION
400 Union Street, Mishawaka, Indiana

CALL THE TRANSMISSIONEER
—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the white pages of your telephone directory for "Dodge Transmissioneer."

DODGE
of Mishawaka, Ind.

For more facts circle 509 on Reader Service Card

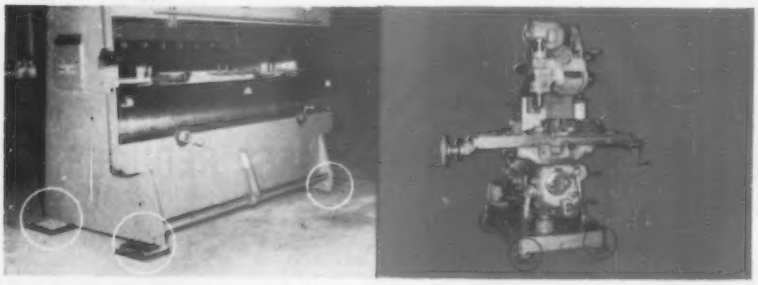


NEWS ABOUT MACHINE MOUNTS

"UNISORB IS COST-SAVING, SIMPLE, FLEXIBLE MACHINERY MOUNT"

SAYS AUTOMATIC TIMING & CONTROLS, INC.

Automatic Timing & Controls, Inc., King of Prussia, Pa., has made extensive use of Unisorb for installing production machinery, examples of which are shown here.



Unisorb provides ATC with three important advantages: 1. Eliminates scarred and pitted floors, 2. Installations made simply and cheaply, and 3. Machinery is secure but can be easily moved.

Try Unisorb on Special Trial Offer! Install just one machine and you'll be convinced — if not return the pads and we'll credit your invoice. Call or write today.

UNISORB 206 SOUTH ST. BOSTON 11, MASS.

Division of The FELTERS Company

Want more information? Send for set of Unisorb "Facts" Books!

Please send me a set of Unisorb "Facts" Books and trial offer request.

Company.....

Name.....

Address.....

City.....Zone....State.....

FACTORY / EQUIPMENT NEWS

Begins on page 106

For more about these items, circle item numbers on Reader Service Card next to back cover.

134—Zipper Y's and T's permit instant construction of complete waterproof cable assemblies on the spot. Zippertubing is wrapped around wire bundle, then zipped shut; it can also be used as a flexible mold to hold potting compound around wire bundle. *Zippertubing Co.*

135—Static D-C Power Supply package for motor drives (ratings to 300 kw.) may be used instead of motor-generator set in processing lines and similar applications requiring non-reversing adjustable speed drives. Uses transistors to regulate output. *General Electric Co.*

136—Retaining Ring Kit contains 376 cadmium-plated Truarc retaining rings, with sizes packed individually in numbered envelopes. Kit includes shaft sizes from ¼ to 2½ in.; internal, external, and universal crescent ring designs. Priced under $35. *Bearings, Inc.*

137—Temperature Monitoring system eliminates electronic scanning—substitutes continuous monitoring of large groups of temperatures by independent circuits. Uses miniature resistance temperature detectors to form bridge circuit. *Thomas A. Edison Industries.*

138—Infra-Red Oven Sections for radiant heating, drying, and baking applications can be furnished in any required length, to operate at any voltage, in a wide range of wattage ratings. Element produces little visible radiation, eliminating glare. *Safety Industries, Inc.*

139—Prefab Handy-Hut, all steel, is fire- and weather-proof for long service. Unit is quickly erected at low cost, and easily expanded or relocated. Standard 8-, 10-, 12-ft. widths available with varied window and door arrangements. *United Steel Fabricators, Inc.*

140—Four-Wheel Motor Trolley Hoist offers advantages of low price, low headroom, low maintenance. Trolley will run on special monorail track or standard I-beam; is offered on heavy-duty hoists having up to 15-ton lifting capacities. *American Engineering Co.*

Turn the page

Send for this Free Booklet!

...shows how to design efficient modern washrooms with the help of **Scott's Washroom Advisory Service**

Scott's Washroom Advisory Service is based on experience gained in serving nearly a million washrooms. It incorporates tested and proved principles to follow when planning new washrooms or remodeling present facilities. There's no charge or obligation for this service.

To learn more, send for free booklet. Or, for "quick change" ideas to modernize and increase efficiency of existing facilities, ask to see Scott's 14-minute film "The Day That Dooley Found Peace." Mail coupon today.

"Customer and employee satisfaction can best be guaranteed by a completely streamlined operation," says William E. Engel, store manager of the new $2½ million Harris department store at Riverside, California. "And streamlining," he continues, "includes efficient washrooms that impress customers and employees with their cheerful appearance and modern convenience." To help plan the washrooms, Harris called on the special Washroom Advisory Service offered by Scott Paper Company.

Store superintendent James T. Kennedy shows how Scott paper towels are dispensed from the stainless steel, recessed dispenser-receptacle installed near the washbowls. This modern Scott dispenser is easy to maintain, helps eliminate floor litter.

Off-the-floor washbowls and other fixtures for ease in mopping, individual liquid soap dispensers, large mirrors, tile floor and tile wainscotting, modern lighting, scientifically-planned traffic flow are included in Scott Washroom Advisory Service principles contributing to efficiency and low-cost maintenance at Harris.

In women's washrooms at Harris, Scott recommended mirrors be placed on the wall opposite the washbowls. This reduces loitering at the lavatories to apply makeup and comb hair, and also avoids the problem of hair-plugged drains.

SCOTT PAPER WASHROOM ADVISORY SERVICE®

Scott UHA Towels **Scott Multifold Towels**
Scott Singlefold Towels **ScotTissue**

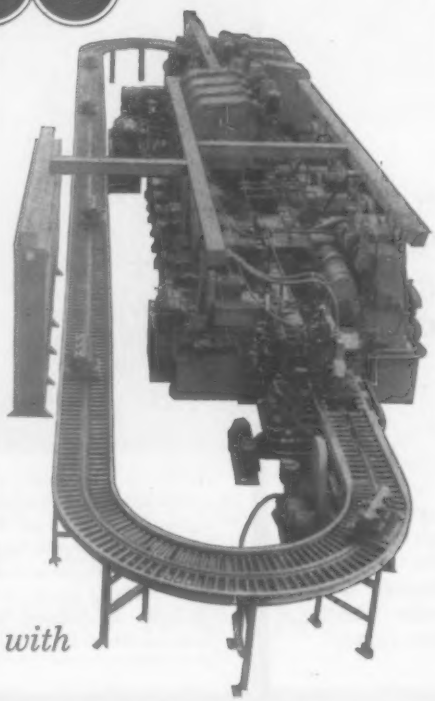
For information on Scott recessed cabinets write:
D. J. Alexander Corporation
2944 East Venango Street, Philadelphia 34, Pa.

SCOTT PAPER COMPANY
Department F-810
Chester, Pennsylvania

☐ Please have a Washroom Advisory Service representative call.
☐ Please send me the free booklet on modern washrooms.
☐ Please let me see the Scott Washroom Film.

Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State_____

computer-controlled conveying to automated production...



Buschman conveyor, integrated into this 23-station machine built by Avey Drilling for leading automotive parts manufacturer, assures continuing machining, checking, gauging and semi-assembly of 360 Automotive hydraulic steering pump bodies per hour.

you can save more with

Buschman *"Experience Engineered"*

WHEEL and ROLLER CONVEYORS

Now, more than ever before, dependable conveying is vital to profitable production. With intricate parts produced in seconds, there is no time for trouble.

That's why leading manufacturers insist on Buschman Wheel and Roller Conveyors for automated and semi-automated applications. Buschman offers low initial and operational costs, proved dependability, and creative engineering assistance for installation design.

Nearly ten million pieces each month are handled and shipped by this computer-controlled transfer station, equipped with Buschman Wheel & Roller Conveyors, in the new warehouse of a leading bearing producer.

Whatever your materials handling problem, Buschman can make low-cost production a reality. Write today for literature.

Every Way Better

THE E. W. BUSCHMAN CO.

4425 Clifton Avenue, Cincinnati 32, Ohio

C-340-EWB

FACTORY / EQUIPMENT NEWS

Begins on page 106

For more about these items, circle item numbers on Reader Service Card next to back cover.

141—Flow Rate Indicator is a rugged, low-cost device for measuring lubrication flow to bearings, coolant flow to electrical devices, and similar services. Meter is available with a vibration-proof flow alarm switch for high and/or low flows. *Fischer & Porter Co.*

142—Adjustable Voltage Drives of package motor-generator type are available in ratings from 3 to 200 hp., with standard speed ranges up to 8:1. Use of transistors, magnetic amplifiers, and metallic rectifiers is said to make new drives highly reliable. *Square D Co.*

143—Centrifugal Compressors in expanded line include single-stage sizes ranging from 25 to 2500 hp., with pressures from 1 to 7½ psig. and intake volumes from 2500 to 140,000 cfm. Multi-stage sizes also available; units for air or gas service. *American Blower.*

144—Expanding Wheel for circular abrasive belts is self-balancing and maintains a flat edge, so it can be used for polishing and tool grinding as well as rough deburring. Two versions of wheel available for speeds between 1250 and 3450 rpm. *Miller Products Co.*

145—Portable Nibbler cuts all types of corrugated metals without clogging—even if the metals have some kind of asbestos or pitch coating. Five models, both air- and electric-powered, run for hours without clogging. Units weigh only 13 lb. *Fenway Machine Co.*

146—Lube Kit for industrial switches contains all lubricants required for routine maintenance of plant's rotary stepping switches. Three 2-dram bottles packed in the kit contain: a blended lubricating oil; a watch oil; and a graphite-oil lubricant. *Automatic Electric Co.*

Turn to page 120

You find Gates Hose where anything flows

Mackinac Bridge, world's longest suspension bridge, connects upper and lower peninsulas of Michigan. Because reliability of equipment is an important factor in the grouting operations, Gates Water and Air Hoses were used.

PHOTOS COURTESY MACKINAC BRIDGE AUTHORITY

Gates Air Hose helps build bridge "that couldn't be built"

TPA 304

Industry everywhere depends upon Gates Industrial Hose to provide air, water, steam, oil and suction for every type of application, including some of the toughest jobs in the world.

Actually there are *tens of thousands of miles* of Gates Hose in daily use — every type and size from air hose the diameter of a pencil to petroleum hose as big as the mains in city streets.

Back of the world-wide acceptance of Gates Hose is a continuing program of *specialized* hose research at the multi-million dollar Gates Research Center staffed by more than 200 chemists, physicists, engineers and technicians.

It is the aim of this *specialized* research to increase hose utility and life, and to lower industry's annual hose costs.

Because Gates Hose is so widely preferred, it is quickly available from leading distributors in all industrial centers in the United States and in 90 countries throughout the world . . . and its outstanding performance is guaranteed by the *World's Largest Maker of V-Belts.*

Gates 18HB Air Hose, with oil resistant tube and abrasion resistant cover, gives exceptional performance on all heavy duty air usage. This popular hose — one of many in Gates full line — is always available from your nearby Gates Distributor.

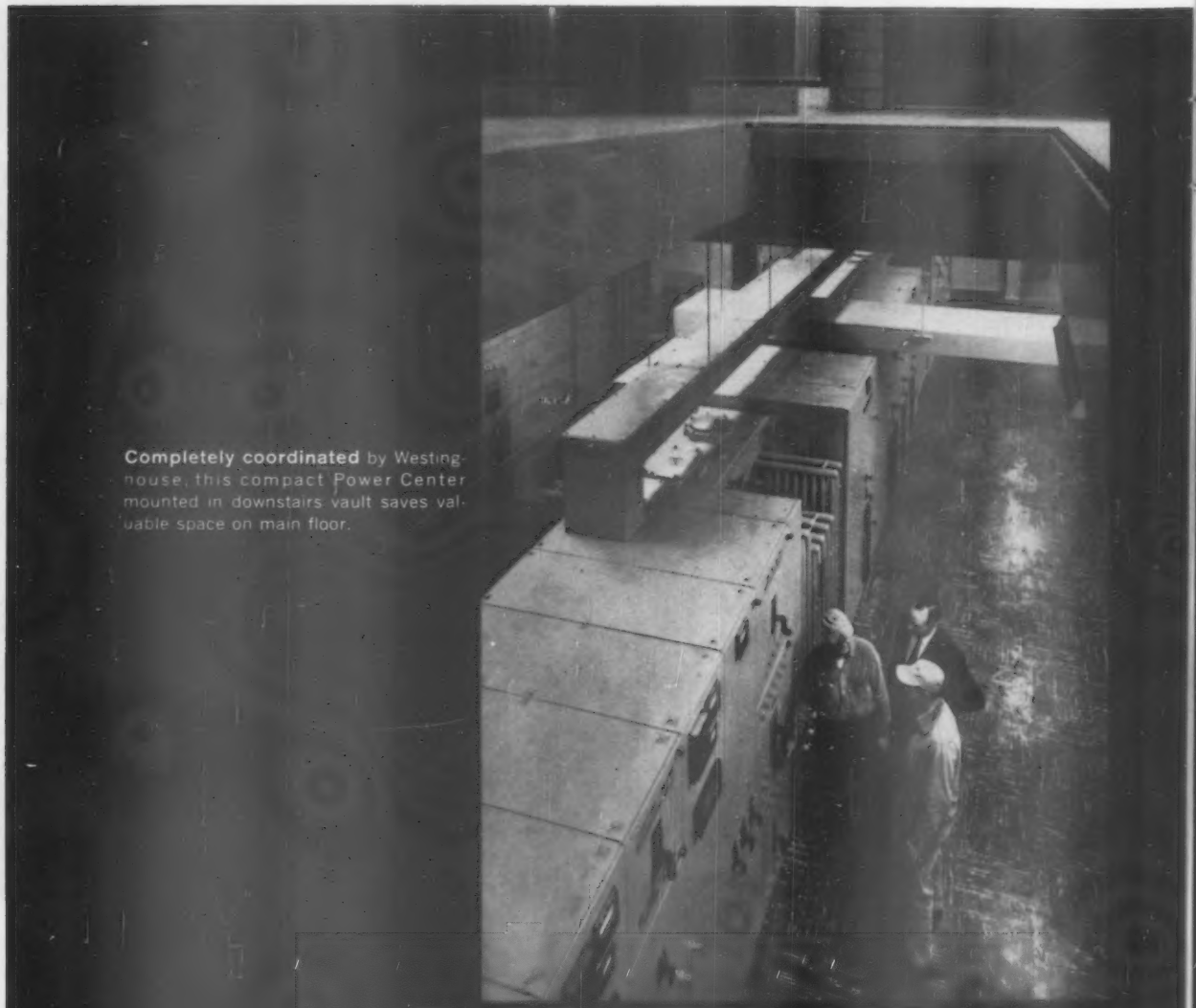
Mark of Specialized Research

Gates

The Gates Rubber Company • Denver, Colorado

Gates Industrial Hose

Made in a Full Range of Types and Sizes



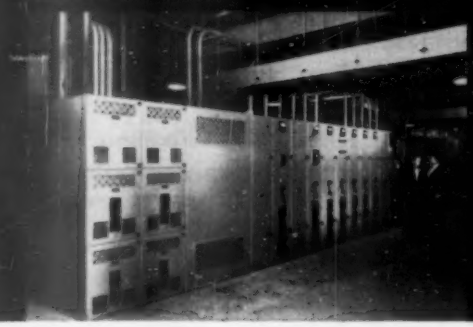
Completely coordinated by Westinghouse, this compact Power Center mounted in downstairs vault saves valuable space on main floor.

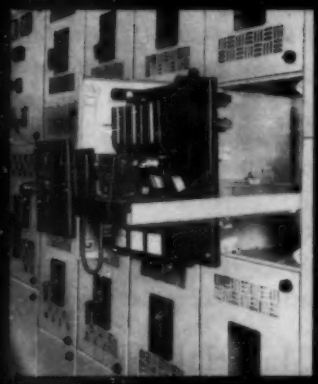
POWER-UP!
for profitability...

modernize your distribution system with compact Power Centers

Balcony-mounted Power Center solves problem of scarce floor space in crowded production areas. Light weight and greater safety of dry-type transformer make such an installation feasible.

Indoor ventilated dry-type Power Centers end the need for oil reconditioning and associated problems. Continuous, close-coupled line-up of low-voltage switchgear, transformer and primary gear results in more pleasing appearance.





Dependable circuit protection assured with Westinghouse low-voltage metal-enclosed switchgear. Type DB breakers use proven De-ion® principle for quick arc extinction. Three-position drawout construction permits breaker to be in operating, test or disconnected positions, with door closed for greater safety to personnel and protection of equipment.

Electrical modernization calls for more efficient distribution of power in your plant. Distribution from your main sub at utilization voltages throughout a plant can be mighty expensive! Line losses mount. Voltage regulation is poor . . . motors lose torque and horsepower . . . and lighting efficiency fades.

Westinghouse Power Centers permit you to get power close to your load at high voltages . . . provide greater flexibility to your electrical system, slash line losses, give increased power continuity. They're all packaged—transformer, breakers and associated equipment—factory-assembled to specification, ready to set down and connect. These compact units can be placed close to the load with short runs at utilization voltages . . . often right in the work area . . . because of their inherent safety.

To learn how an electrical Power-Up program can make your plant more profitable, call your Westinghouse salesman or contact your electrical contractor. Ask for a copy of the Power Chek-Up kit or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania, for a copy of DB 34-150. J-60945

YOU CAN BE SURE...IF IT'S Westinghouse

FACTORY
MANAGEMENT AND MAINTENANCE

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Slickest visual control board we've seen is Rol-a-chart (*Conley, Baltzer & Steward*). Entries are made with a marking pencil on a rotating, transparent plastic sleeve. And erased with swish of a wiping cloth. **(291)**

To keep noise in or out, ask about those new all-metal sound-absorbing panel rooms (*General Sound Control*). Prefabricated in standard modular sizes. Allowance for easy expansion or reduction of room size. **(292)**

Gyro Primer is a dandy 64-page booklet (*Norden*) that tells in down-to-earth cartoons and non-technical language how gyros work. **(293)**

Improve your air know-how with "Basic Pneumatic Control" (*Westinghouse Air Brake*), a 28-page booklet designed to acquaint you with the systems engineering approach to selection and use of pneumatics. **(294)**

Materials handling engineers will want a nomograph (*Automatic Transportation*) that eliminates right-angle aisle calculations. **(295)**

Super-safe gas mask (*Mine Safety Appliances*) has a two-color window indicator that shows condition of canister at a glance. When colors match, you know service life of canister as protection against CO is spent. **(296)**

Scale models of basic components of Encor Modular Enclosure System (*Elgin Metalformers*) can be used on grid floor plan to help visualize final appearance of automation, electronics, communications equipment. **(297)**

Pro-fax might be the material you're after. It's the trademark for polypropylene (*Hercules Powder*), lightest (we're told) of all plastics. **(298)**

Built-in toolholders make Alumiladders (*Werner*) different. One-piece tray top has special receptacles for hammer, screwdriver, etc. Concentric circular ribs of fold-down bucket-holder keep paint cans from slipping. **(299)**

No slipping on catwalks, ramps, etc., if they've been treated with X-L Veneer (*Monroe*), a plastic coating that bonds permanently with metal, wood, concrete. Won't chip, peel, erode. Slip-proof whether wet or dry. **(300)**

Hydro-power wheel (*Stratton*) turns practically any free-rolling equipment into a power-motivated unit. **(301)**

Stencil-matic is a new roller (*Bayberry Products*) that makes the old stencil brush look out of place in any man's shipping room. **(302)**

Maintenance Management is a 12-page, 4-color folder *(Remington-Rand)* that will help you set up equipment records, preventive maintenance schedules, maintenance project schedules, maintenance inventory control. **(303)**

Tool steel comparison chart *(Vulcan Kidd)* covers high speed, hot work, tool and die, plastic mold, carbon and carbon vanadium, etc. **(304)**

Dermatitis your problem? Better equip your safety people with one of those handsome cartoon-illustrated flip-charts *(American Soap & Glycerine Producers)*. An excellent visual aid for use with small groups. Available at cost. Also included: suggested outline for talk to accompany chart. **(305)**

What every businessman should know about profit sharing is a booklet *(Profit Sharing Research Foundation)* that reveals practically all. **(306)**

Angle-bending gage *(Greenlee)* is a big time-saver for any pipe and conduit bending operation. No chance for error. Special notched protractor design allows exact degree of bend to be locked in. **(307)**

You can stop dusting and material losses when filling containers with dry chemicals, salts, etc. Secret is air-operated drum cover *(Richardson Scale)*. Automatic. Foolproof. Filling speed, 6 to 8 drums per min. **(308)**

How to increase the prestige of your mail is the purport of an informative booklet *(Pitney-Bowes)* that points out the practicality of metered mail for smaller as well as big companies. **(309)**

For on-the-job repairs to rubber-lined or -covered equipment, there's a repair kit *(Automotive Rubber)*. Complete with materials and tools. **(310)**

World's smallest strip chart recorder *(Rust Industrial)* is no bigger than a Brownie camera and just as easy to load. Its 63-ft. paper roll yields a full month's continuous logging (1 in. per hour). Weight, only 3½ lb. **(311)**

Snow-Bird is for the early birds who aim to be ready for the first snowfall. It's a powered snow remover *(George Garden Tools)* with blades that feed crusted or wet snow into a high-speed blower fan. **(312)**

You can make indestructible tags on the spot for wires, cables, tools, parts bins, motors. With a new portable hand embosser *(Roovers-Lotsch)*. **(313)**

More Ideas of the Month in Press Time Report following page 72

How to "Turn on a Dime"

Today, production men must "turn on a dime" to meet changing output requirements. One day sales are off—machines are idle; the next equipment must produce at top speed to meet a rush order. This requires unusual flexibility in both men and machinery.

To help solve this problem, General Electric offers a new, packaged, adjustable-speed drive—the Speed Variator. Offering wide speed ranges and good regulation, it can help your machines produce a greater variety of goods, faster and at lower cost per unit.

Find out how this versatile new drive can help you keep pace with today's fast changing production demands. Write for GEA-6643. *Direct Current Motor and Generator Department, Erie, Pennsylvania.*

813-20A

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more about these items, circle numbers on Reader Service Card next to back cover.

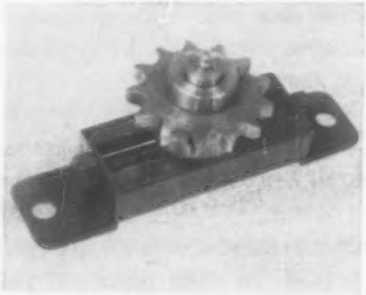
147—Liquid Probe is a small gadget slated for wide use: to discover variations in batches of resins and oils, to check for contaminates in liquids, to sense liquid levels, and to detect moisture in oils or fuels. Device is 3 in. long; head, 1½ in. dia. *Delsen Corp.*

148—Clutch-Brake Combinations are furnished as complete units with bearings, shaft, and mounting stand, in style "SMCB", sizes 2, 3, and 5. Torque ranges from 25 in.-oz. to 175 in.-lb. Clutch and brake coils can be wound up to 90 v. d-c. *Stearns Electric Corp.*

149—Type VL Crane Control is a fully magnetic a-c crane control system that provides operators with great freedom of movement on cab-operated cranes. The small masters can be mounted up front, and the controllers at rear of cab. *Electric Controller & Mfg. Co.*

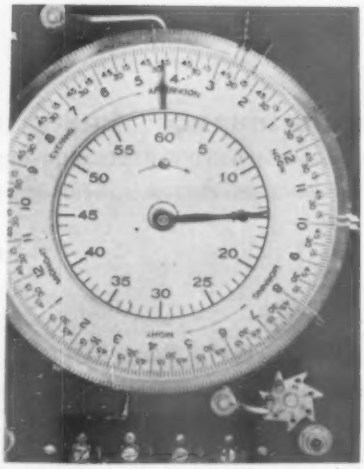
150—Wrap-Around Bumpers, optional equipment on line of platform trucks, are designed to protect both truck and surfaces it contacts. The bumpers, made of non-marking gray rubber, are snap-inserted into a C-section steel channel fabricated to proper shape. *Colson Corp.*

151—Compact PAR-matic adjustable speed drive, in 10-200 hp. ratings, is power amplistat-transistor-regulated to provide greater life and reliability. The flexible, 5% regulated drive unit has wide application—for machine tools, conveyors, etc. *General Electric Co.*



152—Chain Tightener is a compact device designed to smooth out roller chain drives and provide ample take-up for fixed-center and vertical chain drives. The adjusting screw allows fine adjustment of chain on slack side while drive is operating. *Industrial Marketers.*

153—Mist Collector Model MC-412 controls the mists from wet machining operations that endanger employee health and create fire hazards. Spun-glass filters are long-lasting, easily replaced. Coolant collected in bottom of unit can be drained for re-use. *Torit Mfg. Co.*



154—Program Instrument for operating factory time signals is an automatic switch that can be set to close an electric circuit at any 5-min. intervals of a 24-hr. period. Small brass clips locked in program disk select the operating times. *Paragon Electric Co.*

155—Exhaust Muffler is said to cut to near-silence the noise from all kinds of pneumatic air devices. Unit's low initial cost, makers say, is quickly absorbed in the improved worker performance and production achieved in a quiet atmosphere. *EMCO Pneumatic Corp.*

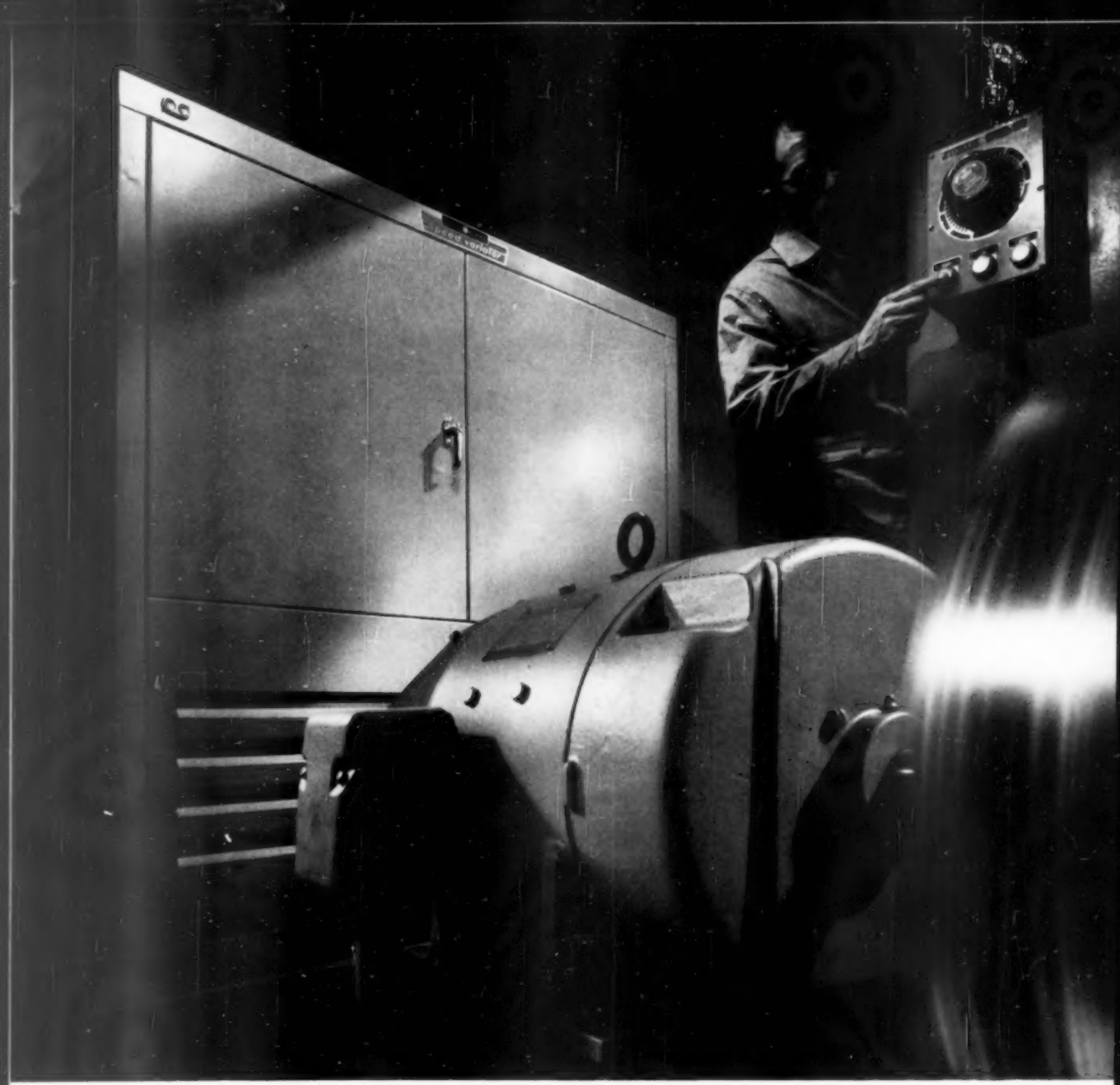
156—Quick Release Valve offers fast, efficient air-pressure venting of cylinders and other pneumatic devices. Because of valve's sensitivity, pressures can be vented in small increments (about .6 psi.). It's built of aluminum, weighs 7 oz. *Westinghouse Air Brake Co.*

157—Straddle-Stacker can carry a 2-ton load on forks between outrigger arms—which eliminates need for counterweight, keeps total truck weight to minimum. Model for narrow aisles has 7-in. long battery compartment, 30-in. over-all length. *Automatic Transportation Co.*

158—"Arid-Air" Filtrator separates high volumes of moisture and sludge from compressed air systems—discharges up to 500 gal. of contamination per hour with no loss of air. Unit re-sets itself after each discharge. Comes in pipe sizes ½- to 3-in. *Wilkerson Corp.*

159—Vertical All-Weather Motor, in ratings from 250 to 2000 hp., is designed for outdoor operation even in hurricane winds, driving rain, snow, sleet, and sand. Motor is made in both hollow and solid shaft construction to meet NEMA Type II specs. *The Louis Allis Co.*

Turn to page 124



5 REASONS WHY YOU SHOULD BUY—

New General Electric Speed Variator

1. Amplistat Regulator offers better speed regulation and adjustable, timed acceleration for improved product quality.

2. Static Exciter, with silicon rectifier, has no moving parts, requires no warm-up, provides more production time, less maintenance.

3. Two-Unit, Four-Bearing M-G Set features Tri-Clad† '55' motor for more dependable performance.

4. Front-Connected Controls, recessed wiring troughs make routine inspection easy, cut maintenance time.

5. Kinamatic* Drive-Motors have field coils encapsulated for longer life. For details on this dependable motor see next page.

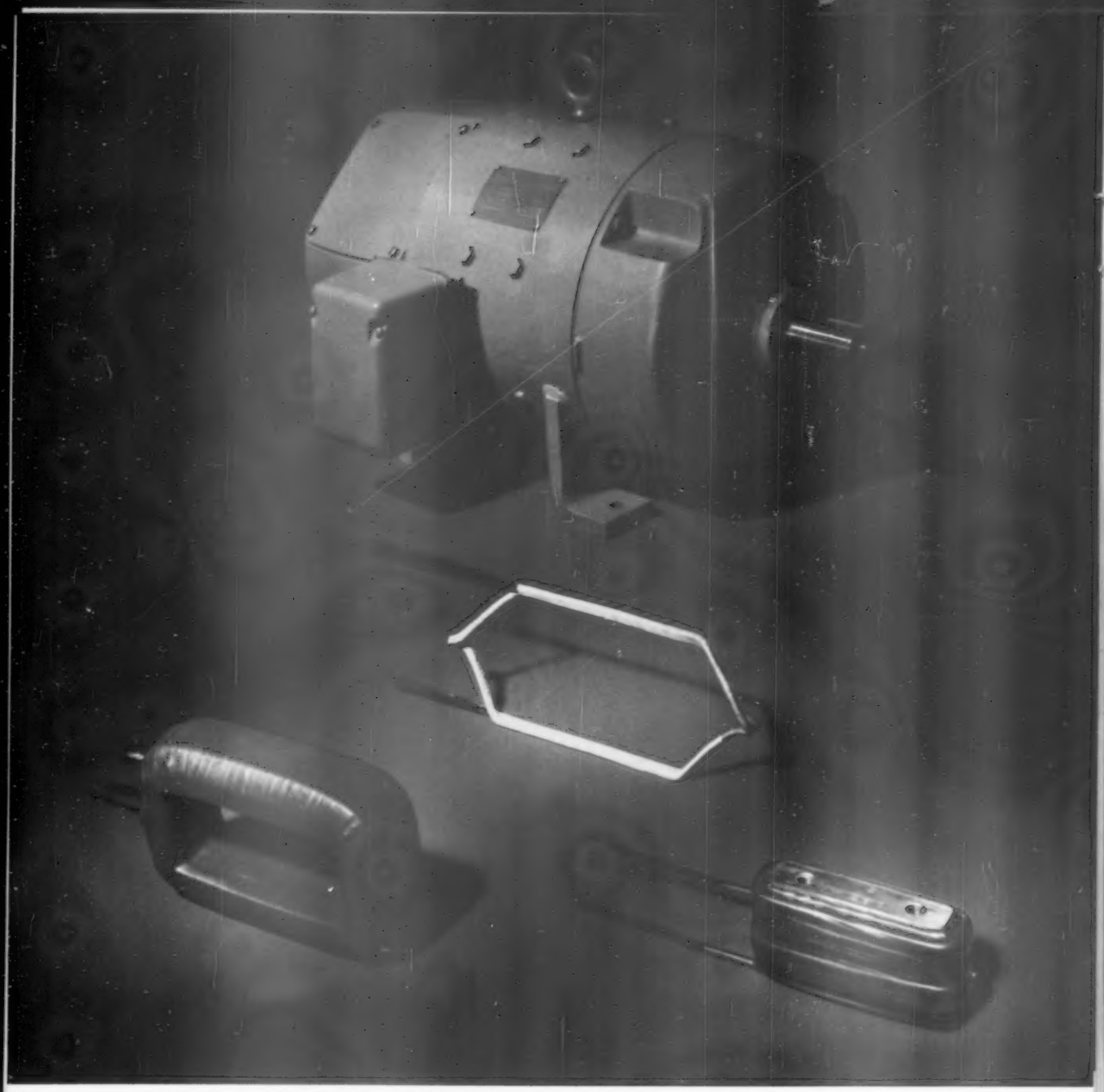
For more information contact your Apparatus Sales Office or write for GEA-6643. *Direct Current Motor & Generator Department, Erie, Pennsylvania.*

In Canada, contact Canadian General Electric, Peterborough, Ontario.

† *Registered Trade Mark General Electric Co.*
* *Trade-Mark of the General Electric Co.* 813-12

GENERAL ELECTRIC

More On Kinamatic Motors



NEW GENERAL ELECTRIC DC MOTOR HAS

Coils Encapsulated for Longer Life

KINAMATIC* ... *a new standard in industrial direct-current motors* ... designed to give extra dependability to automated production systems.

Encapsulated Field Coils ... insulated with mica and glass and permanently sealed against moisture and corrosive airborne materials ... virtually eliminates insulation as an element in motor life and adds a reliability factor never before available in a standard direct-current motor.

Greater Versatility ... a 15% service factor now available in the standard, dripproof d-c Kinamatic motor means user can: 1) obtain 15% more than rated power for normal life of motor; 2) obtain 100% longer motor life at rated power; or, 3) obtain greater versatility on speed and horsepower duty cycles.

Additional information is available at your nearest General Electric Apparatus Sales Office. Or, write for Bulletin GEA-6355. *Direct Current Motor and Generator Department, General Electric Company, Erie, Pennsylvania.*

*Trade-Mark of General Electric Company. 813-12

Progress Is Our Most Important Product

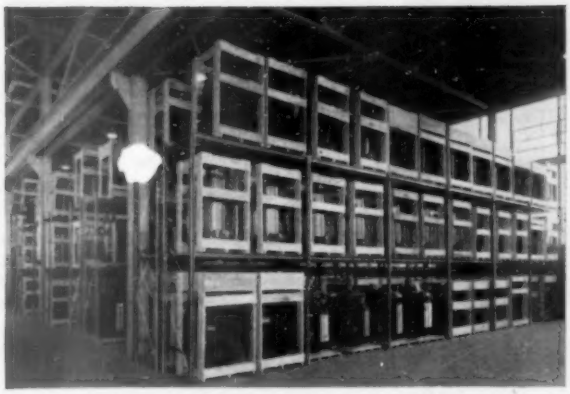
GENERAL ELECTRIC

another important installation

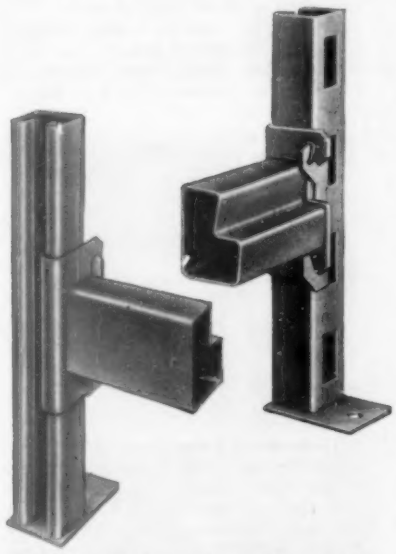
American

Slide-n-Lock adjustable

STORAGE RACKS



American Slide-n-Lock Rack installation — Westinghouse Electric Corp. Warehouse — Cincinnati, Ohio.



View on left above shows the smooth line construction of the aisle side of post and stringer. There are no protruding edges to create hazards. View on right shows the rigid connection when the stringer is "locked" to the post. Both views show the "L"-shaped tubing (no open seams — it is a one-piece continuous welded tube). Stringers raise and lower like a window.

Regardless of your storage problem, you can always depend on American Storage Racks for the most economical and most efficient handling of live storage. American Racks are quality built . . . built to withstand rough, tough usage. Before you decide on any type of rack, investigate the merits of the American Slide-n-Lock Rack . . . a rack tailored to your needs. Here are a few of its many features . . . Stronger and heavier POSTS for greater resistance to shock and abuse . . . "L"-shaped — no open seam — STRINGERS (see copy at left) . . . greater aisle safety (see copy at left). Double cross bracing — material always in tension and not compression — means greater rigidity. Rack can be adjusted to floor irregularities with turnbuckles.

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over 800 different sizes and capacities from 5 basic parts

NO BOLTS NO WELDING IMMEDIATE DELIVERY

AMERICAN METAL PRODUCTS COMPANY

STORAGE RACK DIVISION

5959 Linsdale Ave. amp® Detroit 4, Michigan

←For more facts circle 516 on Reader Service Card

For more facts circle 517 on Reader Service Card

"KEX" Industrial Towel Rental Service helps cut costs at AiResearch

Modern plants use the modern way to handle wiping material requirements—through "KEX", the Industrial Towel Service that cuts costs, boosts efficiency.

Endorsed by the Garrett Corporation AiResearch Manufacturing Division in Los Angeles, the "KEX" Service System, through proper installation and control, has provided the most efficient and effective means of handling wiping material requirements at this plant. "KEX" can do the same for you.

AiResearch is serviced by Prudential Overall Supply of Los Angeles, one of the independent, franchised distributors available through the "KEX" nation-wide service.

See "Wiping Cloths" or write to "KEX" National Service, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE

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It isn't "KEX" unless it's imprinted with the "KEX" name.

FACTORY / EQUIPMENT NEWS

Begins on page 106

For more about these items, circle item numbers on Reader Service Card next to back cover.

160—Plastic Molding Machines, priced under $1000, can produce with precision and economy varied small and sub-miniature plastic items in all thermoplastics including nylon. They'll mold items from 1-oz. units down to intricate sub-miniatures. *Newbury Industries, Inc.*

161—Powerox Electric Pallet low-lift model PXG is fast-operating in narrow aisles. Truck's compact drive mechanism reduces over-all length and allows operation in 6-ft. aisles with 48x48-in. pallet loads. Models have 4-in. lift, up to 6000-lb. capacity. *Barrett-Cravens Co.*

162—Work Bench ideal for assembly work is 48-in. long, 34-in. high, 28- or 34-in. deep; and available with plain steel, tempered pressed wood over steel, or laminated hardwood top. Accessories include shelf, riser, electrical outlet strip, drawers. *Lyon Metal Products, Inc.*

163—Watertight Junction Condulets (NEMA 4, Series WJB) are suitable for both indoor and outdoor use. Electrical wiring inside condulet is protected, even when area is washed down with a hose. Three sizes are available: 4-, 6-, and 8-in. widths. *Crouse-Hinds Co.*

164—Air Make-Up Units, gas-fired, supply clean, pre-heated air to replace exhausted air in all types of plants. New package units come in 4 sizes, designed for quick installation and for operation with natural, mixed, manufactured, or propane gas. *Aerovent Fan Co., Inc.*

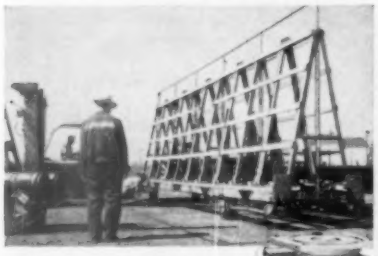
165—Recharge Adapter quickly recharges pressurized dry chemical fire extinguishers in the field—using carbon dioxide. To recharge, lay extinguisher flat, unscrew horn-hose assembly, and screw in CO_2 recharge cartridge in a vertical position. *Walter Kidde & Co., Inc.*

166—Precision Grinding Unit consists of magnetic chuck and controls. These matched units provide variable holding and a "demag" cycle that eliminates residual magnetism. Even thin, fragile work pieces may be removed from chuck without distortion. *DoAll Co.*

Turn the page

materials-handling news

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS



BOEING SKIN DOLLY

Bassick Floating Hub casters (dual wheel) on the lattice-work dolly, above, carry and cradle wing skin panels at Boeing Airplane Company's Seattle plant. Floating Hub construction absorbs shock and snubs out vibration which could otherwise harm loads, dollies, casters and floors.

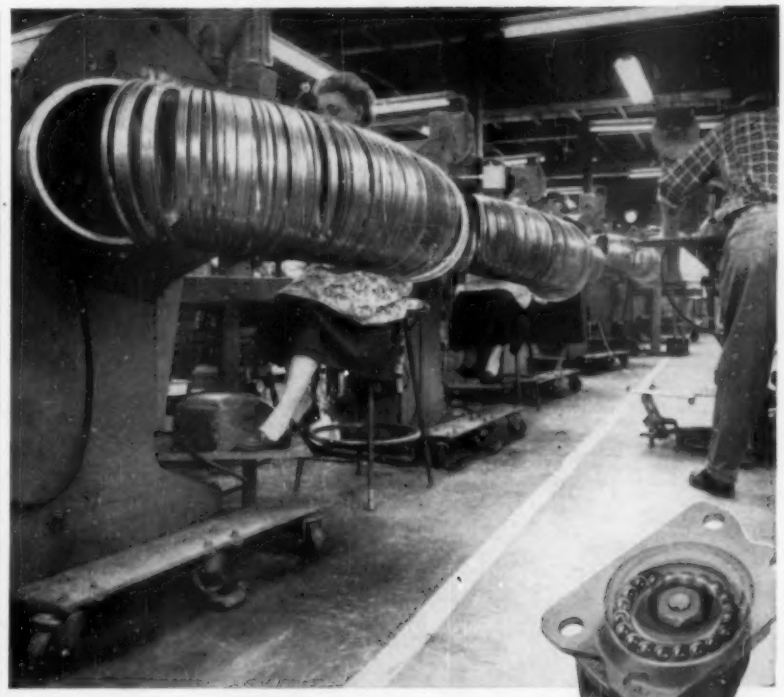
TIRE CORDS

Castered frames are ready to be moved into position for tire fabric production at Goodyear Tire and Rubber Company's Southern Mills. Caster failure here could cause a costly production halt.

CASTERS ON LIFT-A-LOFT

Lift-A-Loft Company's overhead maintenance equipment lifts a man up, wherever he needs to go. Completely self-powered, Lift-A-Loft rolls into position on Bassick Casters. They are a sure sign of quality on modern industrial equipment of all kinds.

see our catalog in Sweet's or write for copy



Two level ball race aids efficient swiveling

In these Bassick Series 77 Casters, above, a single raceway of balls operates on two levels to take both direct and component thrust loads. The hardened and polished steel balls, operating on a large two-level raceway, change level through tunnel passageways where they are not under load. Result of this Bassick exclusive is greater swiveling efficiency, more strength, easier action. **Casters on machine tools permit flexible assembly line set up.** These Series 77 casters help speed production now at the Torrington Manufacturing Company, Torrington, Connecticut. Mounted on fifty machine tools, Bassick casters enable Torrington to rearrange assembly lines as different products go into production. These casters, incidentally, are equipped with new Bassick "Atlasite" wheels that carry loads almost like iron, yet are a lot easier on floors. Bassick position locks hold the machines steady in operation. Is there a materials-handling angle here for your plant?

B-41

NEW HANDLING IDEAS FROM YOUR DISTRIBUTOR Latest caster improvements and new application ideas often come your way when you talk to your local distributor who carries Bassick casters. He gets around to a lot of plants, sees a lot of time-and-money-saving materials-handling methods. Call him on your handling problems.

Bassick SYMBOL OF EXCELLENCE

THE BASSICK COMPANY, Bridgeport 5, Conn. In Canada: Belleville, Ont.

For more facts circle 519 on Reader Service Card

more than steel

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OF KALAMAZOO
STEEL
SHOP EQUIPMENT

designed to meet your needs most efficiently most economically

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FACTORY / EQUIPMENT NEWS

Begins on page 106

For more about these items, circle item numbers on Reader Service Card next to back cover.

167—"Missing Links" connect chain quickly and permanently. These drop-forged, heat-treated half-links are joined simply by peening together—and connection is said to be stronger than welding. They're offered in all chain sizes from $^{5}/_{16}$ to $1^{7}/_{8}$ in. *Crosby-Laughlin Div.*

168—Portable Spray Paint Outfit, with 2-qt. pressure cup separated from gun, allows painter free movement on job. Outfit's air and material regulators permit production quality painting; accurate pressure settings eliminate runs and dusty finishes. *Binks Mfg. Co.*

169—Vertical Battery Chargers for use with electric truck batteries of 6 to 18 cells take only one-third the space needed for horizontal models. Units can be off-floor mounted to save more space; come in 4 sizes, 25 electrical ranges. *Electric Storage Battery Co.*

170—Portable Steam Cleaner—economy model—heats, cleans, sterilizes, de-ices. Flip of ignition switch starts automatic operation—reaches full operating pressure in 3 min. Self-mixing solution tank holds 14 gal.—enough for 4-hr. continuous running. *Vapor Heating Corp.*

171—Three Magnetic Drill Presses clamp on any ferrous surface to simplify drilling in remote or difficult applications. They'll accommodate all makes of portable electric and air drills equipped with dead handle sockets, of up to 2-in. capacity. *Thor Power Tool Co.*

172—Remote Control Switches equipped for 24-volt a-c control by pushbutton, time switches, relays, or other methods, handle up to 200-amp., 600-v. a-c in power or lighting circuits. Open and enclosed models increase safety, cut wiring costs. *Automatic Switch Co.*

Turn to page 133

Amusement park operators* know that their rides must be exciting to be successful. But with the lives of riders and onlookers at stake, operators rely on *quality* wire rope to ensure . . .

a safe ride

Safety comes first, wherever wire rope is used. You may save a few pennies on the purchase of a "bargain" rope. But it will cost you *more* than you bargained for, if it results in injured personnel and wrecked equipment. Make sure you get *quality* wire rope—buy Wickwire Rope.

**Picture shows the Rocket Ride at Palisades Amusement Park, Fort Lee, N. J. Wickwire Rope provides the only support for each of these planes.*

CF&I WICKWIRE ROPE A CF&I PRODUCT

LOOK FOR THE YELLOW TRIANGLE

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver El Paso • Farmington (N. M.) • Fort Worth • Houston • Kansas City • Lincoln • Odessa (Tex.) • Oklahoma City Phoenix • Pueblo • Salt Lake City • Tulsa • Wichita • **PACIFIC COAST DIVISION**—Los Angeles • Oakland • Portland San Francisco • San Leandro • Seattle • Spokane • **WICKWIRE SPENCER STEEL DIVISION**—Boston • Buffalo • Chattanooga Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia 6347

Engineering Campus, McDonnell Aircraft Corporation, St. Louis. Harris Armstrong, architect; Belt & Given, mechanical engineers; MacDonald Construction Co., general contractor; T. J. Sheehan Co. and Sodemann Heat & Power Co., mechanical contractors; all of St. Louis.

Engineering "Campus" for McDonnell Aircraft Corporation

Provides Ideal Environment

Engineers

McDonnell Aircraft Corporation, a leading producer of military aircraft, missiles and components, rates its beautiful new Engineering Campus as "the most efficient and most desirable quarters that have ever been available to any company for its engineering activities."

To illustrate, a Johnson Pneumatic Temperature Control System assures McDonnell engineers of the best working climate today's air conditioning can produce. Instead of ordinary thermostats, which control the dry bulb temperature only, the specially planned system utilizes *Comfostats*, the modern humidity-compensated thermostats made exclusively by Johnson. By automatically regulating the temperature in relation to humidity changes, Johnson *Comfostats* offer maximum flexibility and accuracy in meeting comfort demands under varying conditions of room size, occupancy, use and exposure.

Even more precise regulation is provided in the Campus' bomb shelter and electronic data processing areas, which are controlled on a constant temperature and humidity basis.

For "after-hours" heating and cooling savings, *Comfostats* throughout the building may be centrally reset by groups to maintain non-occupancy economy temperature levels without humidity compensation.

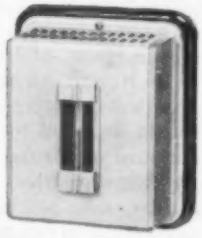
An expertly engineered control system by Johnson can help assure any building of the thermal environment best suited to its needs. When you build or modernize, have your local Johnson representative show you, your consulting engineer or architect how the advantages of Johnson Pneumatic Controls can be applied to your plant or offices. Johnson Service Company, Milwaukee 1, Wisconsin. 105 Direct Branch Offices.

GET THE "PLUS" VALUES OF PNEUMATIC CONTROLS BY JOHNSON

- **Widest Application.** Johnson Controls are applied to all types and makes of air conditioning, heating and ventilating equipment, and can meet any comfort or process requirement. Each system is engineered to meet the exact needs of the individual plant.
- **Greater Simplicity.** Pneumatic control involves far fewer and much simpler components than anything else you can use. There are fewer components to check, fewer parts subject to failure.
- **Choice of Features.** Johnson makes the most complete line of pneumatic temperature, humidity and pressure control equipment to match your needs.
- **Reliable Performance.** Johnson Pneumatic Controls are unaffected by short circuits, electrical overloads, voltage variations and humidity. You get continuous, accurate control.
- **Complete Safety** . . . even in the presence of explosive gases, solvents, dusts and other hazardous materials.
- **Dependable Service** . . . Johnson maintains the oldest and largest service organization in the industry. Full time, factory trained service men are on duty in 105 direct branch offices and over 200 other cities.

THE ONLY INSTRUMENT OF ITS KIND

The Johnson *Comfostat* controls from "effective" temperatures, regulating temperature in proportion to humidity changes. Since comfort at any given temperature varies according to the relative humidity, this humidity-compensated instrument meets modern comfort demands with greater accuracy than ordinary room thermostats, which control the dry bulb temperature only.



JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

FACTORY
MANAGEMENT AND MAINTENANCE

HUMAN RELATIONS

By GEORGE A. HOY, JR., Industrial Management Editor, FACTORY

Zipped Lip Is No Help

"Employers must eliminate workers' fear of criticism —not criticism itself—to establish good worker-boss relationships. Fear of criticism can crush vision and wet-blanket enthusiasm." Quotes are from a speech by T. A. Duckworth, secretary and personnel director of Employers Mutuals of Wausau (Wis.).

In other words, tight lips don't counteract long faces. Might as well speak out your criticisms.

Sure, It's OK to Think

Feel guilty when someone comes into your office and catches you looking out of the window making long-range plans? Most managers do, said Prof. Mason Haire, of University of California, Berkeley, in a Hawaii address to members of the Young Presidents' Organization. Haire feels there's a stigma attached to sitting and thinking, and that's the most important part of the manager's job.

"Everyone here, I'm sure," he said, "has dodged this by rushing around with a handful of papers or dashing out to talk to someone or having him come in. One of the best excuses for not doing your job, which is to look out the window (planning), is to seem to be busy chugging around doing other things. . .

". . . in bad times you have the feeling you can't afford to be looking out the window, in good times you're too busy to look out. So really you never plan ahead, unless you set aside time for it."

Professor Haire's topic was "Planning the Future in Personnel." He made these fine suggestions:

. . . *Plan your labor relations far in advance*. Unions do. Haire suggests two bargaining committees. One to bargain this year and next, the other to plan long-range bargaining objectives.

. . . *Make up a future personnel budget*—a plan for your organization's form in the supersonic future.

. . . *Pass your long-range thoughts* through the organization. Give everyone a glimpse of the future.

Paying Middle Management

Ever wonder how much better you'd do financially if you moved up a notch or stepped up your contribution to the boss's "team"? You can get an idea from the experience of Robert J. Howe, Director of Salary and Organization, Thompson Products, Inc. (Cleveland). Howe is also chairman of the executive committee of the Wage and Salary Council of the National Industrial Conference Board.

Howe says: "If a division manager . . . is paid a base salary of $50,000 the highest man under him will probably receive about 55% of this amount, although the figure will range from 40 to 70%. Lowest member of this group may receive about 25% ($12,500), ranging from 18 to 31%. In the case of a manager receiving $20,000, his highest man will probably receive about 70% of his salary. Lowest man in this group is likely to receive about 45%. Appropriate ranges are plus or minus 25%."

You can work this backwards to estimate the rewards that are in store for you as you move ahead. But be honest with yourself. Don't overestimate your contribution to the team.

Overloading the Work Horse

Resist that natural impulse to delegate to the most handy employee, the employee trained to do the job, or the one who has handled it before. This may be the easiest course, but it is often not the wisest in the long run. Advice is from Dr. D. A. Laird, in his book *The Techniques of Delegating* (McGraw-Hill Book Company, Inc.). Reasons given:

- It overloads the willing work horse.
- It is likely to generate jealousy of and opposition to the "favorites."
- It can easily create one or more over-confident "crown princes."
- It won't develop the weaker employees. Then what do you do if your star gets promoted or quits?

How's Your Reputation?

"Company image" may be helping or hindering your technical personnel hiring program. Technical men on the job hunt are influenced by these factors:

- Information and rumors picked up from others.
- Use of company products.
- Articles and advertising in newspapers, magazines.
- Convention displays.

These and countless other factors contribute to an over-all attitude toward your company, its growth potential, achievements, stability. Data come from a motivation research study by Deutsch and Shea, technical manpower consultants, New York City.

The study showed that a reputation for poor personnel policies, particularly as they affect the professional man, can cancel out the positive effects of brilliant technical achievements.

Handicapped Workers Excel

Latest study of handicapped employees comes from Du Pont Company, Wilmington, Del. As most studies before it have proved, handicapped employees as a group outperformed their more fortunate brothers in safety, job performance, attendance.

Two facts make the Du Pont study stand out:

1. All 1021 surveyed were handicapped severely enough to prevent them from handling "such jobs as the average non-impaired worker could handle."

2. The study separated employees handicapped at employment from those whose handicaps developed after going to work for the company. Those handicapped when hired outperform others on all counts.

Pick any part of the statistics you like and you see a study in incentives. The handicapped feel a need to excel—and they do. Those who have the handicap at time of hiring have the strongest need to "prove their worth."

Aromatic Award

No compliment—that describes the zoological exhibit given to the most wasteful, least clean shift at B. F. Goodrich Company's Tuscaloosa (Ala.) plant. The animal: a common musteline mammal of the genus ephitis—some people call it a skunk.

Purpose of the exhibit: You guessed it, motivation of managers and workers.

Rock-a-by Industry

Three key problems face industrial management in its relationships with employees, according to Horace Y. Bassett, president of Calumet & Hecla, Inc. He made the keynote speech at the Fortieth Silver Bay Conference on Human Relations in Industry.

1. Cradle-to-the-grave philosophy. Says Bassett, ". . . We are creating in the minds of most of our people a complete dependency on someone else for a solution to their problems. This is equally true of management, salaried, and hourly employees."

2. Softness in management. "There is a growing reluctance in management to constructively criticize . . . for fear of creating a bad situation and having an adverse effect on human relations."

3. Pride of workmanship. "If the concept of pride of workmanship cannot be reinstated in our plants, it can be disastrous to American industry."

Solutions, anyone?

Utopia Defined

This 10-point insurance policy for high morale comes from Prof. H. S. Bretsh, University of Michigan. If an employee meets these requirements, he should be happy as a lark in your plant—or anywhere.

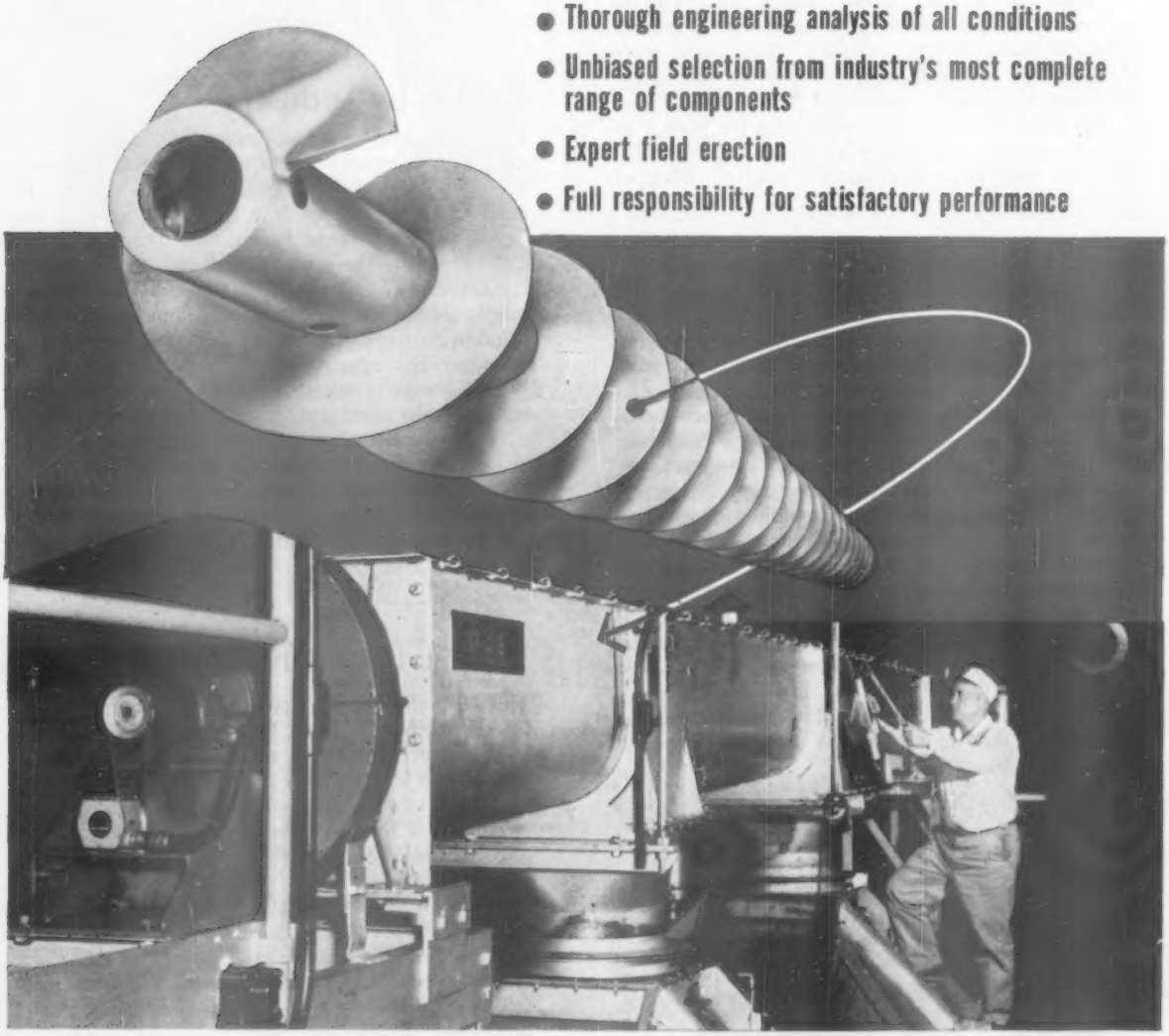
- He knows what's going on that may affect him.
- He has a feeling of belonging, probably due to participation in some of the affairs of his department or his company.
- He has a feeling of mastery. The difficulty of the task is unimportant, as long as it is recognized as important to the plant's total effort.
- He knows that ways and means of solving interpersonal problems exist. This is comforting even if he doesn't need to use them.
- He believes that every effort is made to take the anxiety out of his work situation, make his job and work relationships pleasant.
- He feels that people pay attention to him when he makes a point or voices a gripe.
- He knows there are channels through which his grievances may be heard.
- He feels that pay and position are coordinated.
- He knows there is opportunity for advancement.
- He knows he has unique integrity and worth, even though he may have less authority than some people.

Some of these (the last is an outstanding example) are partly outside the manager's control. But most are a direct function of your work climate.

Here's why a Link-Belt engineered screw conveyor installation means

a better-working system ...less work for you

- Thorough engineering analysis of all conditions
- Unbiased selection from industry's most complete range of components
- Expert field erection
- Full responsibility for satisfactory performance



FROM design of equipment to operation, you leave nothing to chance when you leave everything to Link-Belt's complete screw conveyor service. Whatever your needs, Link-Belt can engineer a system to meet them exactly . . . if desired, will handle entire erection and accept full responsibility for placing your system in operation.

Included in Link-Belt's full line of components are 17 basic screw designs, available in a variety of metals. Each offers Link-Belt's exclusive Quik-Link feature that permits fast, easy removal of any conveyor screw section or hanger without disturbing other components. An equally complete line of troughs, ball and babbitted bearing hangers, trough ends with ball bearing flange blocks and trough end seals, couplings, gates, spouts, and drives makes Link-Belt your convenient, one-source supplier for all your requirements. Ask your nearest Link-Belt office for Data Book 2289.

LINK-BELT

14,707

SCREW CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

FACTORY / EQUIPMENT NEWS

Begins on page 106

For more about these items, circle item numbers on Reader Service Card next to back cover.

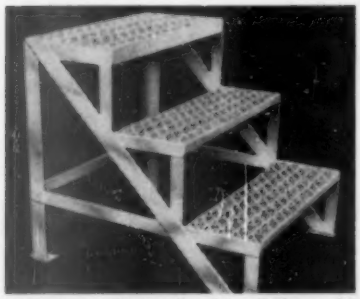
173—Pneumatic King-Size Clipper drives king-size clips at rate of 200 per min. and sets up bottoms of empty cartons at cost of a fraction of 1¢ each. Portable unit (75 lb.) can be moved to work, connected to any air line supplying 60-80 psi. *Container Stapling Corp.*

174—Four-Way "Inching" Air Valves will advance the ram of a double-acting air cylinder to any desired point and stop it dead at that point. And it will stay there, without creeping. Applications include hoists, assembly tables, many others. *Mead Specialties Co.*

175—Die-Handling Truck of 20,000-lb. capacity is capable of positioning dies on and off either side or end of its platform. Truck uses single stabilizer bar, easily pushed out from either side of platform to be butted against press. *Elwell-Parker Electric Co.*

176—Profiler (Model P-500) allows unskilled labor to perform precision routing, milling, duplicating, and grinding operations on metals, plastics, wood, glass, rubber. Micro-feed guide button is a feature; direct-drive power quill eliminates vibration. *Tool-Lab, Inc.*

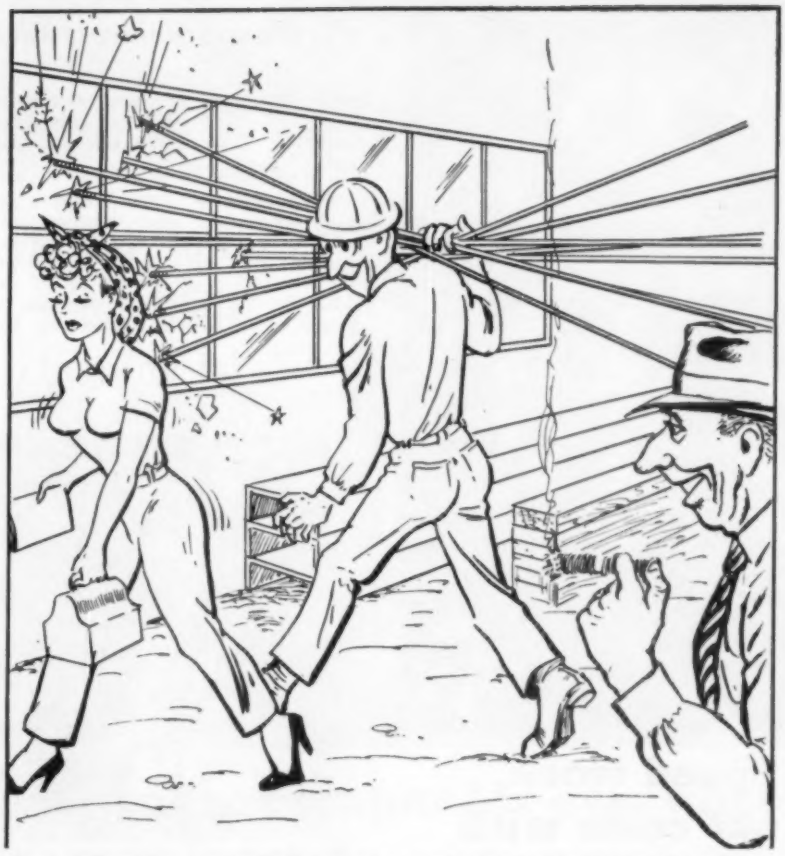
177—Automatic Positioning System uses direct-dialing analog programer for rapid machine set-up on short production operations—such as punching, drilling, inserting. System is a time-saver for programing repetitive motion patterns. *CDC Control Services, Inc.*



178—Heavy-Duty Service Stairs with non-slip grating are handy to have around any plant—ideal for use in servicing machinery of all types. Movable platform has a safe load capacity of 300 lb. Units come in sizes and heights to your specs. *Bustin Steel Products, Inc.*

179—"Autostrapper" Machine uses hydraulic and pneumatic power to strap any size product which fits machine's adjustable opening. Unit twist-ties new "oval-strapping"—or uses round strapping up to 12-gage—to reinforce large bales, cases, pallet loads. *Wiretyer Corp.*

Turn the page



That's OK, Joe—we're knockin' 'em out to put in RESOLITE FIBERGLASS PANES!"

End costly pane replacement with SHATTERPROOF RESOLITE

In factory window maintenance, the cost of lights is only a fraction of your bill. It's glazing labor that ups the tab!

You can't shatter RESOLITE FIBERGLASS panes. Once you replace your glass lights with Resolite panes, you'll have glazing that will last virtually as long as the sash. The resulting savings in maintenance add up — year after year!

BETTER LIGHT, TOO!

The glass fibers in Resolite act like millions of small lenses, diffusing the daylight to provide more "horizontal light", more effective interior light distribution.

FIRE RETARDANT PANES

In addition to the standard Resolite polyester resin formulation, where desired, panes are supplied in fire-retardant FIRE-SNUF® formulation, Underwriter's Laboratories labeled and Factory Mutual approved.

Clip and mail this coupon for complete information, specifications and installation details.

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Please send me, without obligation, Bulletin 586, with complete information about factory glazing with Resolite fiberglass panes.

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Company.....

Address.....

City.....Zone.....State.....

FMM

For more about these items, circle numbers on Reader Service Card next to back cover.

180—"Ram-Pump" Lube System lubricates bearings on single machine units while they operate. Two air-operated pumping units are available: one model for low-pressure applications of oil; the other for high-pressure applications of grease or oil. *Lincoln Engineering Co.*

181—Remote Cup Spray Outfit is ideal for small paint jobs in cramped quarters—eliminates lugging around big pressure tanks and yards of hose. Unit consists of 1- or 2-qt. cup with fluid and air-flow control, plus short lengths of hose leading to gun. *DeVilbiss Co.*

182—JackStacker "Walkie" Truck is counterbalanced-type, for high stacking loads to 1000 lb. in narrow aisle space. It's 63¾ in. long over-all, with 24-in.-long load. You operate it from a control handle while walking along with it. *Lewis-Shepard Products, Inc.*

183—Automatic Assembly Machine provides all elements required for piece-part feeding and positioning in one compact station. Unit handles 1/16- to 2-in. parts, at speeds to 6000/hr. Stops automatically if a part is missing or malformed. *Dixon Automatic Tool, Inc.*

184—D-C Motor Brakes, for use with NEMA 600 series mill-type motors and equivalent sizes of standard motors, feature high rigidity, simple adjustment, and easy servicing without disturbing torque adjustment. Line includes 10- to 23-in. wheel sizes. *Clark Controller Co.*

185—Portable Electric Winch powered by car or truck battery lifts 2500 lb. or pulls 5000 lb. Unit works on 6- or 12-v. battery; weighs 60 lb., is 27 in. long by 12 in. wide. Drum speed is 32 rpm.; drum capacity, 150 ft. of ¼-in cable. *City Engineering Co., Inc.*

186—Automatic Checkweigher is offered for weighing cases, cartons, and bags of 20 to 100 lb. Accuracy is 0.1%; speeds up to 30 products per min. Unit is designed for installation in a production line; cases or bags are weighed in motion. *Exact Weight Scale Co.*

187—Visigard anodic signaling system gives low-cost insurance against corrosion failure of water-heater systems. Easy-to-read meter, located on water heater jacket, provides means of quickly checking protective capacity of tank-protecting anodes. *Cleveland Heater Co.*

188—Battery-Powered Platform Truck for lifting and hauling skids has 4000-lb. capacity, maximum lifting height of 21 in., lift speed of 12 fpm. loaded. Platform is 26 in. wide; 36-60 in. in lengths. A 6000-lb.-capacity truck is also available. *Clark Equipment Co.*

189—Silicon Power Rectifier for all types of power applications can provide average forward currents up to 160 amp. per cell in single-phase circuits, or 150 amp. per cell in 3-phase circuits with maximum peak inverse ratings up to 500 v. *Westinghouse Electric Corp.*

190—Tapered Slip Fittings adapt to produce various types of bends—permit quick assembly of diverse pipe and tube structures such as storage racks, railings, and scaffolds. Adjustable cross fitting, with diamond boss, rotates through 90 deg. *Wallace Supplies Mfg. Co.*

191—Hydraulic Pipe Cutter cuts 12-in. cast iron water main, 15-in. soil pipe, or 36-in. clay tile in less than one minute. It can cut pipe in a ditch, in a line, or anywhere that chain can be wrapped around pipe—it requires no vise or turning. *Wheeler Mfg. Corp.*

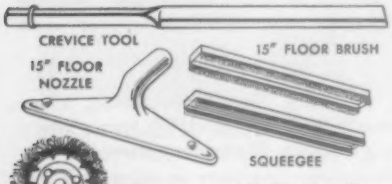
192—Wiring Trough (2½x2½ in. ID) is available in 1- to 5-ft. lengths, with fittings such as end caps, 90-deg. internal elbows, "T" and "U" connectors. Covers have keyhole slots, so it's not necessary to remove screws to take off cover. *Wadsworth Electric Mfg. Co., Inc.*

Turn the page

Speed work, cut costs with B&D accessories

You clean up work with a lot less effort when you use genuine B&D accessories with B&D tools.

For instance, B&D's handy *Accessory Rack* carries all the vacuum attachments you need to do the job; keeps 'em handy, ready to use. Crevice Tool puts the finishing touches to a real vacuuming job. Wide 15″ Floor Nozzle and Floor Brush pick up a swath of dirt and dust in one pass, and B&D's Semi-Rigid Hose lets you get into those tight, tough spots.



WIRE WHEEL BRUSH

HOLE SAW

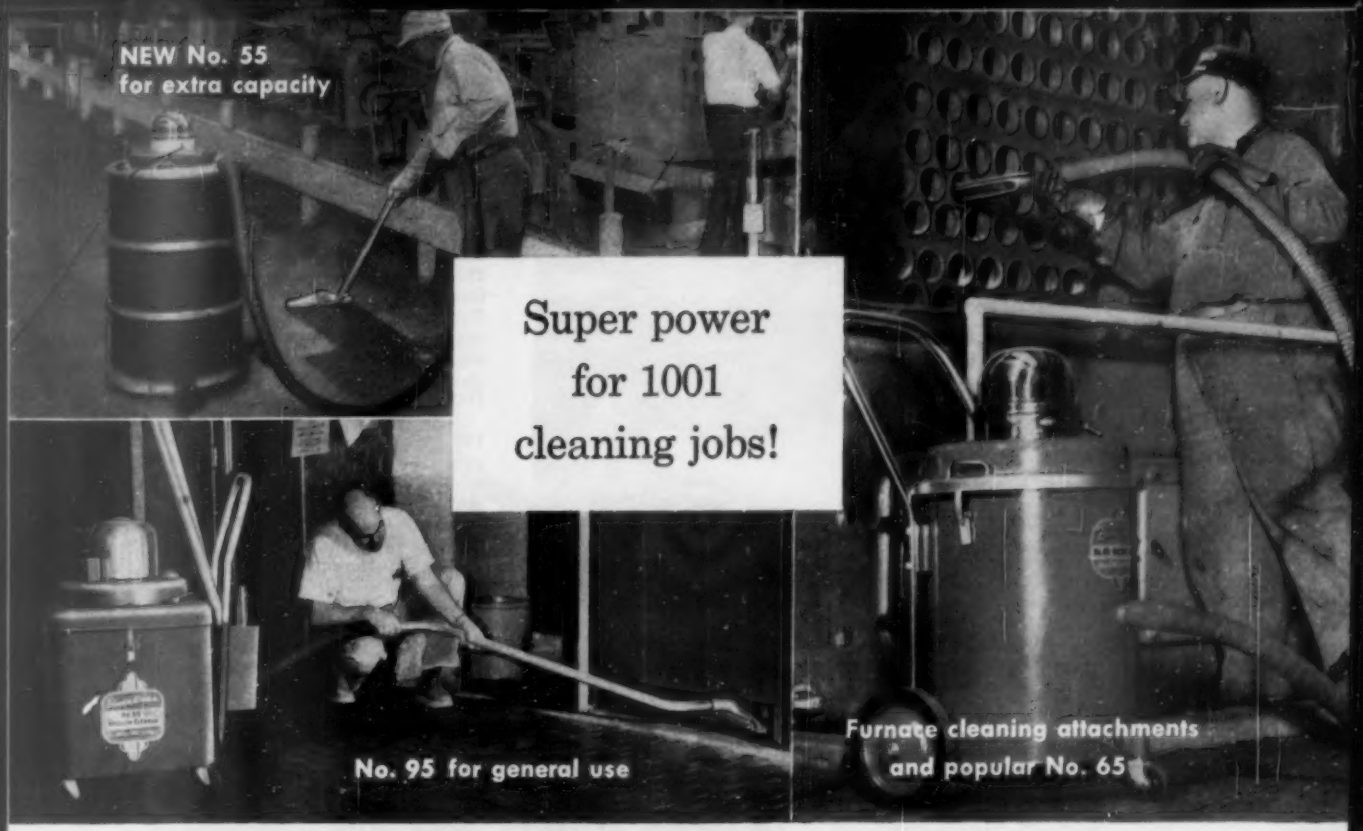
Phone your B&D distributor for these and accessories for other B&D tools like Whirlwind Wire Wheel Brushes®, High Speed Hole Saws and Mandrels or Forged Hammer Tools. He stocks 'em all—stands ready to serve you.

INSIST ON THE BEST

Black & Decker®

ACCESSORIES DESIGNED FOR THE TOOL

For more facts circle 525 on Reader Service Card ➤



A Black & Decker Vacuum Cleaner for every use!

ACCORDION TYPE HOSE extends to 10 feet. Tough, durable, sucks in bolts, nuts without harm. Wraps around motor housing for easy storage.

VERSATILE—COMPACT enough to fit through narrowest of passageways. Completely mobile. Roll easily over rough floors. No. 55 mounts on 55 gal. drum and dolly.

COMPLETE ACCESSORY LINE for every need. For furnace cleaning combine No. 65 Vacuum Cleaner with attachment assortment or select No. 648 Furnace Cleaner.

HANDY ACCESSORY RACK on No. 95 carries all attachments you need to do the job. Attached to handle, it can be removed easily for quick cleaning.

Whatever your cleaning problem—office, halls and carpets; factory floors or scrap pick-up, there's a Black & Decker Heavy-Duty Vacuum Cleaner to do the job! All completely mobile—all packed with twice the suction—with plenty of guts for both wet and dry cleaning.

Choose the model you need: No. 65—perfect for general all around use, takes 3¾ gallons of liquid; ⅛ bushel dry. No. 95 for constant, heavy-duty use —13 gallons wet; takes 1½ bushel dry. No. 55 for extra-capacity—mounts on a 55 gallon drum. Mail coupon for free demonstration.

Leading Distributors Everywhere Sell

Look Under "Vacuum Cleaners" in Yellow Pages

Black & Decker®

Quality Electric Tools . . . Power-Built to set the pace

MAIL TODAY FOR A FREE DEMONSTRATION

THE BLACK & DECKER MFG. CO., Dept. 0709, Towson 4, Md.
(In Canada: Brockville, Ontario)

Please arrange a demonstration of
☐ No. 55, ☐ No. 65, ☐ No 95 Vacuum Cleaner(s)
☐ Send additional literature

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

☐ Glue Pot

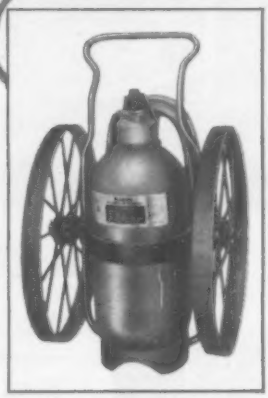
☐ Jig Saw

☐ Drill

☐ Belt Sanders

NEW!

One-Man Dry Chemical Kills More Fire Faster!



This new Kidde pressurized 200-pound extinguisher gets *more* fire-smothering dry chemical on a blaze *faster!* Its universal nozzle discharges a dense 40-foot stream that gives more efficient extinguishing action, greater heat protection for operator.

It has an *extra* 50 pounds of dry chemical to discharge on any stubborn blaze. Not 150 pounds, but a full 200 pounds of dry chemical – a 33⅓% bonus for safety! Yet its total weight is less – no heavy, cumbersome gas cylinder.

It's faster to operate too. No valves to unscrew. No wait for pressurization, for dry chemical to fluff. No pressure reducer to malfunction. Just remove safety pin, swing valve toggle, and flip "on-off" nozzle lever. There's no hose whip either.

Only Kidde has the Bridgeman seal head assembly. When pressurized at 450 psi with nitrogen or *dry* air, an inner force of three tons acts on the seal – the more pressure, the tighter seal. Virtually leak-proof, tamper-proof.

Check these other benefits. A low, balanced center of gravity, wider handle, compact design, and larger, lubricated wheels make it easy to move. It's weather and corrosion protected. And the shielded dust-and moisture-proof pressure gauge tells at a glance this extinguisher's readiness for action.

Write Kidde today and get the full story on this new U.L.-approved One Man Fire Engine.

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1032 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

FACTORY / EQUIPMENT NEWS

Begins on page 106

For more about these items, circle item numbers on Reader Service Card next to back cover.

193—Power Roof Exhausters of reinforced Fiberglas offer many advantages. The units will not dent, never need painting. And material is sound-absorbing, corrosion-resistant—even to salt spray in coastal areas. Capacities from 100 to 11,000 cfm. *The Gallaher Co.*

194—Photocopy Table, designed to hold photocopy and duplicating machines, has a convenient utility drawer plus roomy, shelved storage cabinet for activator bottles and other supplies. The finish of the table top isn't damaged by spilled chemicals. *Marnay Sales & Mfg. Co.*

195—Molded-Case Circuit Breakers JK and JKL provide 225- and 400-amp. continuous-current ratings in 30% space savings. Compact new J-frame breakers, both 2- and 3-pole models, provide interrupting ratings of 25,000 amp. at 600 volt a-c. *I-T-E Circuit Breaker Co.*

196—Low-Cost Filter Unit serves as a combination filler cap and breather filter for hydraulic fluid, fuel, and oil reservoirs. Unit is designed to protect against airborne contamination that can damage such system components as pumps or valves. *Bendix Filter Div.*

197—Multi-Pul Tool takes the place of a lift, hoist, or tackle for thousands of lift-lower-and-pull operations. It requires only a single operator, cuts maintenance costs. Twin-reel model shown has 6000-lb. load rating; single-reel unit is also available. *Indus Corp.*

198—Magnetic Drum Separator for process industries uses Indox V ceramic magnet material to separate tramp iron from granular products in enclosed chute or spout conveyors. Ceramic magnet assembly is said to produce a very powerful and uniform magnetic field. *Stearns Magnetic Products.*

For more facts circle 526 on Reader Service Card

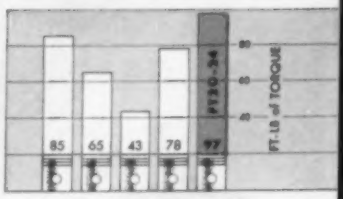
For more facts circle 527 on Reader Service Card→

NEW and outstanding

...ON FOUR BIG COUNTS

ALLIS-CHALMERS
FT20-24
2,000-LB
LIFT TRUCK

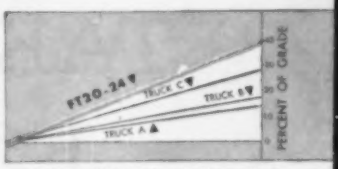
OUT-POWERS . . . with full 35 hp — the most in its class. Better yet, it's honest *industrial* engine power — built to develop high torque at *usable* working speeds for lift trucks.



The engine in the new FT20-24 develops 97 ft-lb of torque.

OUT-MANEUVERS . . . operator steps onto the clean, open platform from either side . . . works comfortably on a wide, cushioned seat . . . spots loads quickly with responsive finger-tip controls . . . turns sharply . . . can have the advantages of optional POWER SHIFT torque converter drive . . . *moves more* day after day.

OUT-CLIMBS other 2,000-lb trucks . . . is sure-footed and tough. Just watch it take steep grades up to 40 percent, loaded. It has extra power, balanced weight distribution and greater lateral stability.



The FT20-24 with full load, will climb a 40% grade.

OUTLASTS . . . bonus strength from mast to rear counterweight keeps it on the job far beyond the usual life expectancy for lift trucks. There is no unnecessary strain on working parts. With automotive-type frame, the engine and drive components are not required to serve as structural members.

Further, the machine can be prepared for service in seconds — stripped for overhaul in minutes — and returned to work hours, even days, sooner than most machines.

How about a demonstration! Let your Allis-Chalmers dealer *show* you how the all-new FT20-24 can out-perform, and bring substantial savings in material handling costs. Send for NEW, FREE Booklet BU-485. Allis-Chalmers, Milwaukee 1, Wis.

BH-86

ENGINE: Industrial-type — Gasoline or LP Gas

Displacement	133 cu in
Horsepower	35 at 2,400 rpm
Torque, ft-lb	97 at 1,400 rpm

GRADABILITY:

Truck will climb with full load	40% grade

DRIVE:

Standard or (optional) POWER SHIFT with torque converter

LIFTING:

Standard lift	131¼ in.
Lifting speed, loaded	50 fpm
Tilt angle	10°

Compare Performance . . .
Compare FT20-24 Specifications . . .
Compare Price!

DIMENSIONS:

Length to front face of forks	69 in.
Width, maximum	32 in.
Minimum intersecting aisles truck negotiates	55½ in.
Turning radius, outside	62 in.

TIRES:

Drive	18 x 5 x 12⅛ in.
Steer	16¼ x 4 x 11¼ in.

ALLIS-CHALMERS

Is your shipping dollar being TAKEN FOR A RIDE?

Don't be misled by so-called "bargain rate" air-freight and truck carriers. You may find you're paying *higher* minimum charges and getting far *less* service. Compare these Railway Express advantages before you ship with any other carrier.

HERE ARE DOWN-TO-EARTH FACTS ON RAILWAY EXPRESS SERVICE

Widest Coverage—Railway Express serves some 23,000 communities to give you mass distribution—with *one company responsibility*. You can reach *every* major market in the U.S., and with Railway Express International Service—most every major market abroad. No more worries about delays and divided responsibility in transferring between two or more carriers.

Special Low Rates—You get door-to-door delivery, at no additional cost within REA vehicle limits. What's more, Railway Express offers special low commodity rates on ready-to-wear merchandise, graphic arts materials, hosiery, shoes, drugs, import-export traffic and many other categories. Call your nearest Railway Express Agent. He'll tell you why—

RAILWAY EXPRESS AGENCY

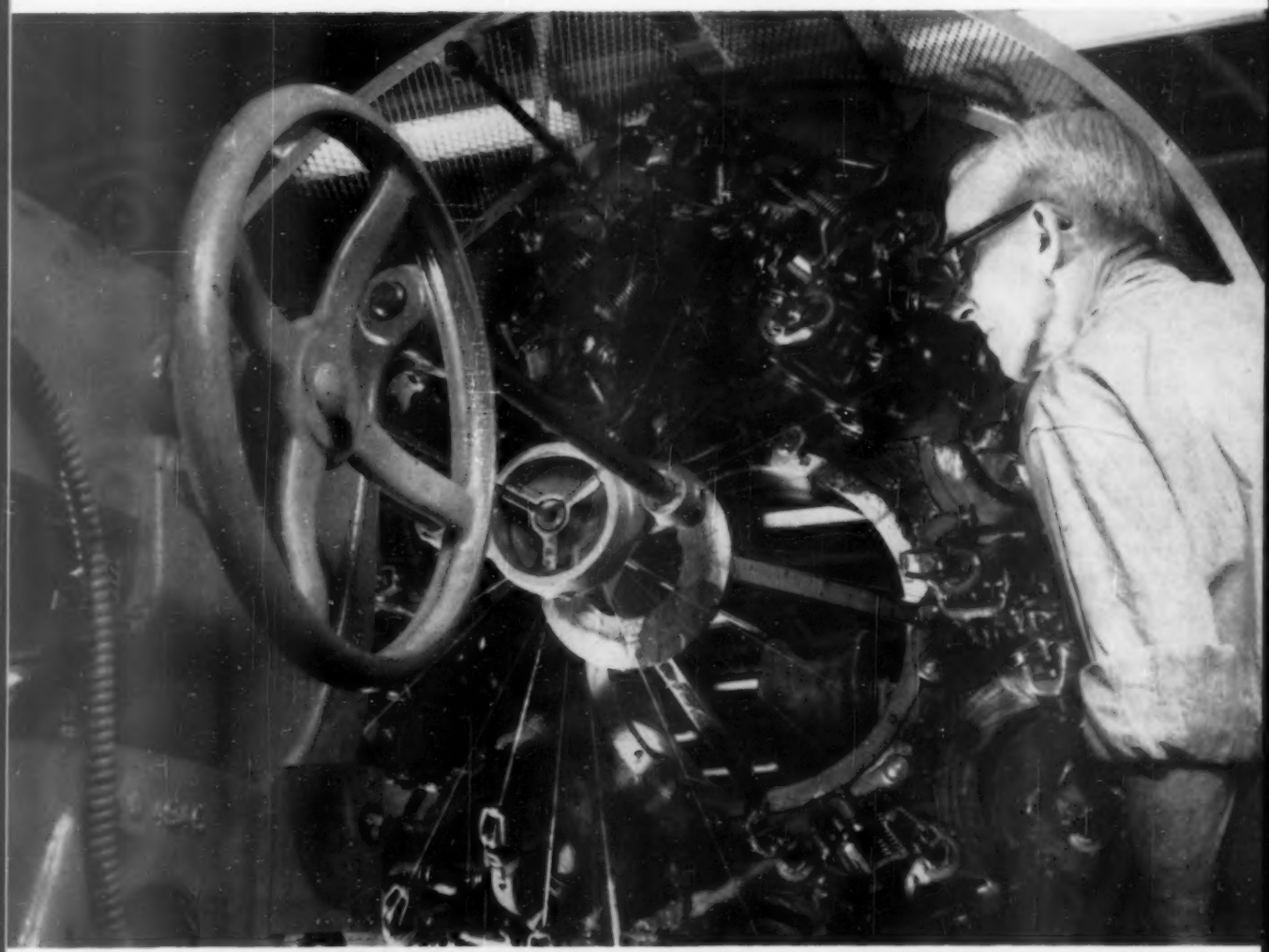
THE BIG DIFFERENCE IS RAILWAY EXPRESS

FACTORY
MANAGEMENT AND MAINTENANCE

PLANT OPERATING MANAGEMENT

CASE BOOK

WARREN J. KING: EDITOR



VETERAN BRAIDER AND HIS NEW MACHINE TEAM UP TO MAKE BETTER HOSE COVER . . . PAGE 141

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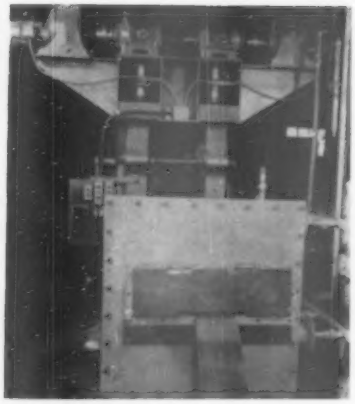
IN GOES POWDER . . .



OUT COMES COPPER IN . . .

Newest Way to Make Strip

Producing high-quality hot-rolled copper strip from powder on a commercial basis will soon be a reality. The E. W. Bliss Company already has a pilot line running at its Rolling Mill Division, Salem, Ohio. Bliss expects to save up to 80% on equipment and production costs with this new method of making strip. And tests show that strip produced by this method has comparable or superior mechanical properties to that produced conventionally—and lower oxygen content.

Bliss, along with Chemetals Corporation (New York), has been perfecting this new process for the past six years. Process begins with chemical production of metal powder from various sources including cements, scrap, ore, and concentrates. Powder is mechanically fed into a hopper and guide (left photo). (On the pilot line, feeding is manual but commercial production equipment will have mechanical feeders.) The materials first pass through a mill for green compacting, next through a protective-atmosphere heating furnace for sintering, then immediately through hot-rolling equipment (right photo). After these basic process steps are concluded the strip may be sintered and hot-rolled again to produce consolidated metal of 100% density.

End result of this process is equal to or better than conventionally produced strip, according to laboratory tests. Tensile strengths on samples tested were roughly 10% greater than electrolytic-grade copper strip made by conventional methods. However, elongation was slightly higher in the powder-made strip, averaging about 32% against 31% for conventionally made strip. The powder metal copper coils tested were 0.040 inch thick, 6 inches wide, 100 to 200 pounds in weight.

Bliss and Chemetals had to solve many production problems in developing the new process. Had to design special rolls and feed devices to produce green compact of uniform thickness and density with extremely uniform, sound, and square edges. And had to do research on protective atmospheres, sintering times, and sintering temperatures.

Turns Out Cans 50% Faster

"Two-high" cans are the order of the day at Continental Can Company (New York). The new technique makes can bodies in tandem, then separates them along pre-scored lines into individual units. Result: a 50% boost in production rates.

The new method has been in use commercially for about a year. It involves the use of double-sized prescored blanks. These are formed into cylinders and then seam-soldered. The double bodies are separated along the score line (photo). Continental is also exploring the possibility of fabricating can bodies in multiples greater than two.

Move'em—Keep'em

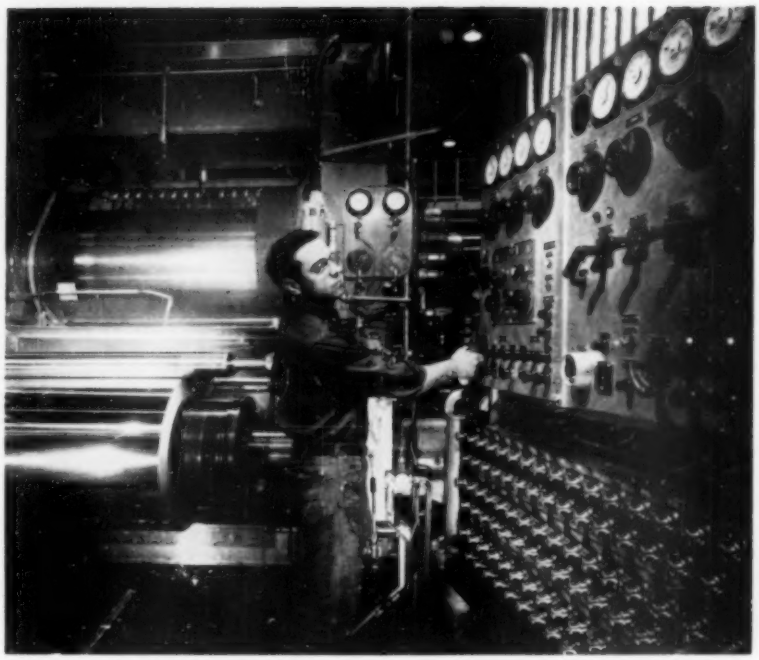
Other companies moving from Los Angeles to the Santa Ana vicinity of Orange County, Calif., lost as many as 30% of their employees. That was the problem the Electronic Engineering Company faced when it decided to make a similar move. But a combination of four factors helped Electronic Engineering cut losses to just 14%. Here's how:

. . . *Communication played an important part.* As soon as the site was purchased, the president announced it. After that the company publication carried articles about the area while information about houses for sale and rentals in the new location was posted on bulletin boards. And an all-day sight-seeing bus trip let employees see the site, building, and general area.

. . . *Employees got special help.* A home information packet was mailed to every employee to help him decide which community he would settle in. The company also provided personal advice through a "relocation hostess," who set up shop in a plant conference room four months before the move date. Do-it-yourselfers got a boost from a company arrangement to pay half of their moving costs. The company also liberalized its emergency loan policy to include down-payments on homes in the Orange County area.

. . . *Pre-move hiring arrangements were made with the relocation in mind.* New hires recruited from other parts of the country moved to the new location immediately, even though the facility was not completely ready for occupancy.

. . . *General company climate of giving consideration to employee suggestions pertaining to the move helped the process.* For example, management encouraged employee participation in site selection from the beginning, investigated all reasonable suggestions fully.



X-ray Gives Precision Thickness

Here's an automatic gage with built-in feedback that provides closer control of foil thickness, greater yield, and shorter processing time. Performs its function continuously on a 72-in. foil mill at Kaiser Aluminum & Chemical Corporation's Ravenswood (W. Va.) Works. Makes life easier for operators, too. A single setting of the automatic control (center of left panel above) eliminates the tedious job of continually adjusting roll pressure, tension, and speed.

The automatic system adjusts both mill speed and unwind tension as much as 10%. This is done in response to a deviation signal from the x-ray thickness gage. When an off-standard condition occurs, automatic adjustments restore the desired strip thickness. The 10% limit on automatic corrective action prevents excessive speed and tension changes. Further corrections above 10% can be accomplished manually. But the automatic gage may reverse a manual adjustment if it is detrimental to holding acceptable delivery tolerances.

Actually the system operates by maintaining a continuously predescribed relationship between two variables—desired thickness and actual thickness. Key feature of the control relationship is the x-ray unit. As rays pass through the metal coming from the mill a certain percentage proportional to the thickness and density of the strip is absorbed. This loss is the basis for measuring thickness after corrections for alloy and various other mechanical factors have been made.

Braids Wire for Longer Life

(Cover Story)

This modified braiding machine produces a new type of wire covering for flexible Teflon hose at Titeflex, Inc. (Springfield, Mass.). Technique is called Zero-Motion Braiding. It offers increased life by decreasing elongation and contraction under pressure to less than 0.5%.

Sudden application of pressure on flexible hose creates axial and diametric forces. Because the inner core is elastic (400% elongation), all forces go directly to the braid. While axial force tends to elongate the braid, lateral forces expand the braid diametrically, causing a contraction in length.

Titeflex engineers found that by applying individual braid wires at a certain angle (the tangent of which is equivalent to the ratio of the axial

force to radial force), there is no relative motion among wires. This reduces wear on braid wires when the hose is impulsed, thus increasing the hose's life span. (The 0.5% referred to above is based on motion of hose under maximum operating pressure.)

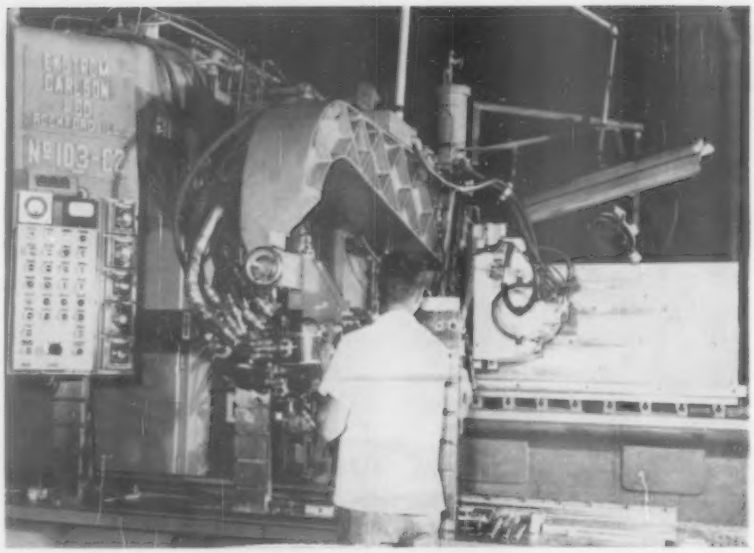
Giving Recruits Their Say on Jobs

Finding the right college graduate is only half the recruitment battle these days. The graduate has to feel certain the company he picks is right, too. This thinking led the Torrington Company (Torrington, Conn.) to set up a "Job Comparison Chart" —a checklist for seniors and graduates scouting for jobs.

The chart has space for data on eight companies, four main categories:

- Product. Its diversity, future growth, and uses.
- Company. Size, success, stability.
- Job. Description, responsibility, opportunity, experience, travel, transfers, training, work conditions, educational opportunities, salary, fringe benefits.
- The community. Geographical location, accessibility, housing, cost of living, recreation, churches, social organizations, schools.

Graduates develop their own rating system for these many elements. Total score produces a rating for each job and company.



MIRROR PUTS TOOL "IN THE GROOVE"

Mirrors like the one you see at right above help machine operators to set cutting tools accurately against parts being machined at the Fort Worth plant of Convair Division of General Dynamics Corporation. With mirror, operator can adjust this three-dimensional machine without even stirring from his position at the control panel. Result? Mirror makes full-time operator's helper unnecessary. The plastic-backed, circular mirror hangs from an arm attached to the machine's vertical cylinder housing. It's adjustable in vertical and lateral planes. Cost was negligible because the mirror parts were salvaged from the scrap pile.

Nary a Squash in These Soft Boxes

Here's a neat trick Kraft Foods Company (Chicago) uses to stack freshly produced margarine and marshmallow products while they are still soft. Workers strap four wooden corner posts to the lower pallet load. Thus second-tier pallet rests on posts, not on soft products.

After the material has cooled and hardened, corner posts are removed and used again. Meanwhile Kraft saves storage space in the refrigerated storage room of its Peshtigo Court plant. Without the posts, top capacity on each unit of storage space would be only 36 packages. Now it has doubled—72 packages per storage unit.

Throw One Switch, Cool Two Rooms

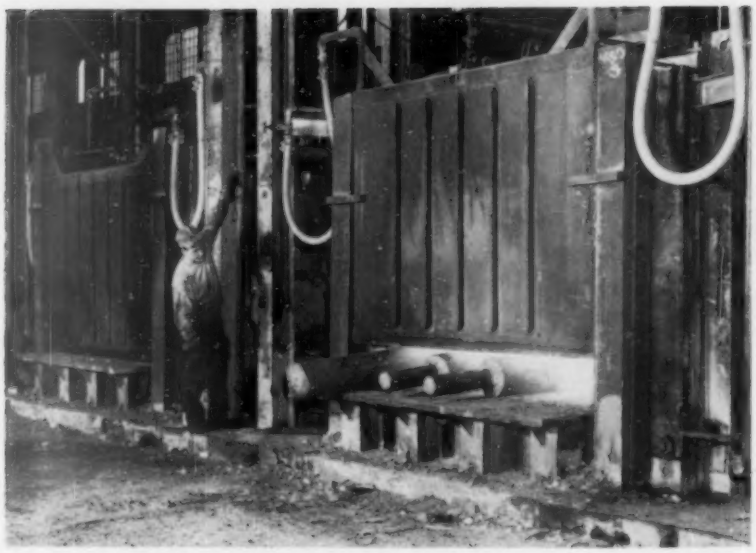
"Free" air conditioning of the plant lunchroom is achieved at noon by a motor-operated damper in the laboratory air conditioning system at Adamas Carbide Corporation. Except when a test must run through lunch, lab personnel throw a switch, thus cool the lunchroom next door. After lunch, same switch shifts air conditioning back to lab.

Source: Gerard Scheyer, Plant Engineer, Adamas Carbide Corporation, Kenilworth, N. J.

Halves Space Needs, Cuts Handling

These inexpensive bar-stock racks cut storage space needs 50% at Van Norman Machine Company (Springfield, Mass.), a Division of Van Norman Industries. The six racks (home-made from old channel and angle iron) cost only $500.

Racks hold 12 or 16-ft. lengths



WATER-COOLED FURNACE DOORS SAVE ON MAINTENANCE

There's no more rebuilding and relining billet-heating furnace doors every six months at American Forge & Manufacturing Company's McKees Rocks (Pa.) plant. Not since the old solid doors were replaced with water-cooled ones. The first water-cooled doors installed at American Forge have been in use for over a year without interruption. Still need no repair even though they're exposed to temperatures ranging as high as 2400 F. Nor do the new doors chill the billets in the furnace. The new lightweight doors (Blaw-Knox Company, Pittsburgh) are lined with insulating brick. Cooling water comes from heavy tubing at each side.

of bar stock, save a total of 432 feet of valuable space. Pyramid shape of the welded racks facilitates crane handling, lets cut-off men using a jib crane draw their own stock, thus relieves two standby men in the bar-stock section.

Insulates Steam Line

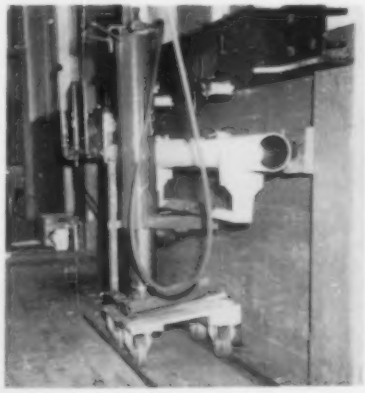
Want to insulate an above-ground steam line in a hurry? You'll find the answer at the Kolker Chemical Company (Newark, N. J.). It reduces the time to insulate an 8-in. steam line by nearly 20%. It's high-temperature pipe insulation with its own built-in tie wires (photo). Here a 2½-in. thickness of the new material (Baldwin-Hill Company, Trenton, N. J.) is being applied to 400 feet of steam line.

Felted spun mineral wool is the insulating agent. Its outer surface has a metal fabric facing of 16-gage wires welded in a rectangular mesh. Seven of these wires extend from one end to serve as tie wires. When hooked under the matching stay wire on the meeting edge of the blanket, they hold the insulation snugly around the pipe.

Computer Takes Oral Orders

Here's the newest way to get an electronic "brain" to do what you want. Just talk to it! Chances are talk will have no effect on your present unit. But it will on a new type of computer developed jointly by the Air Force's Air Materiel Command and Remington Rand Division of Sperry Rand Corporation (New York). New system, known as AIMACO (Air Materiel Command Automatic Compiler), will initially respond to spoken instruction from 30 English verbs. Unit can be enlarged to take orders from additional verbs as circumstances dictate. Basic system is already in limited use, will be operating generally on major AMC activities by year-end.

This development means the average operating man will soon refer his accounting and computational needs to computers in his own terms. He won't have to learn or cope with the complex language of the machine. Naturally, replacing the laborious task of manual translation from English to machine language (a bottleneck since the advent of electronic data processing) is a great time-saver. Also it will save considerable time and expense involved in training programing personnel.



Plastic Wheels Take the Shock

This movable hydraulic lifter mounted on plastic, nylon-reinforced wheels positions guided-missile launching apparatus for testing at Benrus Watch Company (Waterbury, Conn.). During tests, the lifter undergoes considerable shock as it snaps into position. Reason for using plastic wheels is that they have just the right shock-absorbing qualities for this application, don't crack under the impact or absorb so much shock that they distort alignment stability. Thus the plastic wheels (The Fairbanks Company, New York) are able to keep the lifter in position during critical testing.

Conveyor Speeds Scrap Processing

They're wrestling 2.5-million pounds of scrap metal a year at Boeing Airplane Company (Seattle), with a big boost from a conveyor system (Link-Belt Company, Chicago). Vibrating screens segregate smaller material, while larger chunks and pieces pass to a conveyor for easy removal and segregation by hand. Old way was for scrap to be dumped into big hoppers, then hand-sorted. Bars and sheets were removed first, smaller pieces down to nuts and bolts last. New way is faster, easier, far more efficient.

Speeds In-Plant Truck Service

Two-way radio plus a central dispatcher's peg-board (photo) enables the Pittsburgh Works of Allis-Chalmers Manufacturing Company to speed intra-plant shipments. The new communications network controls movement of eight trucks, one station wagon. Vehicles service plant buildings scattered over several blocks, must operate on public streets and company roads to move material from one shop to another.

The dispatching station operator can contact drivers anywhere throughout the area. After the dispatcher gets a call for service, he checks his peg-board and operation log to find the location of the nearest vehicle, then sends it to make the required pick-up.

Between calls the dispatcher keeps the peg-board up to date and enters data about each transfer in the operation log. At present the dispatcher handles an average of 24 calls an hour.

Blow-It-Up Shelter

Plastic bubbles like this make fine shelter-tops while work goes on below. E. I. duPont de Nemours & Company needed temporary covers during lining of five open-top tanks. Saved about $6000 (and several days' work) by using Mylar film instead of wood or steel. And the air-supported bubbles kept the tanks clean and dry during fall cleaning at the company's Waynesboro (Va.) plant.

Transparent "balloons" of 5-mil. Mylar were positioned by crane, then secured by cable drawstrings to the upper tank rims. Next a blower inflated each balloon in 10 minutes, held it in place by maintaining an internal pressure equivalent to about 0.4 inches of water. Installation of cover on each tank took about two hours (tank diameters range up to 49 feet).

Transparency of the film eliminated the need for artificial lighting and reduced heating requirements by providing a solar heat trap. When job was completed, balloons were removed, rolled into compact bundles, and stored ready for next job.

Style Change in Fire Suits

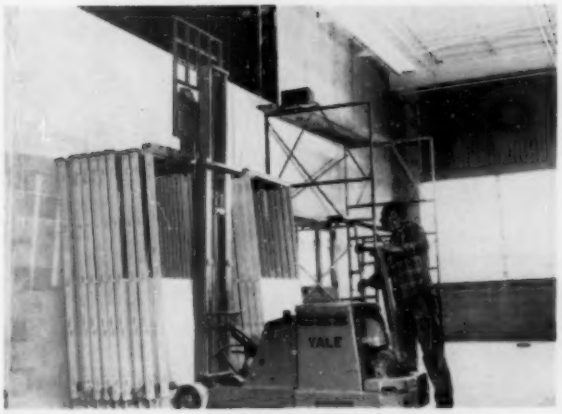
These new fire-fighting suits could be just the thing for your plant smoke-eaters. The three-piece suits, developed for the Air Force by Minnesota Mining & Manufacturing Company (St. Paul), let men walk right through fires hot enough to char asbestos.

Effectiveness of the new suit depends on a micro-thin layer of aluminum that reflects 90% of the radiant heat away from the wearer. He can enter a blaze without being wet down or covered with foam. Protection is so effective he can remain exposed to intense radiant heat from a 2550 F. source for 25 seconds. With equivalent protection from standard insulation he woudn't be able to move. New fabric is flexible and lightweight. Coat and trousers are worn over regular bunking clothing.

Hear Quality Story

Supervisor talks are the best way to impress employees with the effect their work quality has on the final product. That's the finding of Kearfott Company, Inc. (Little Falls, N.J.). After lectures by supervisors, the company polled employees. Workers said they had better understanding of the quality problem, were more aware of the mutual responsibility of management and workers for reliability of missile components. Company had tried posters, bulletin boards, notices, letters with less effect.

Fourteen supervisors were selected for the lecture program, then briefed with reliability data from in-plant and field sources. Each lecturer adapted material to his own field of work. Quality control and training departments helped in the adaptations. Total of 1000 workers heard the quality story during one week—on company time.



HANDLES OFFICE PARTITIONS 10 AT A TIME . . .

CUTS MACHINE PLACEMENT TIME TO MINUTES . . .

REDUCES CEILING INSTALLATION BY DAYS.

Lift Trucks Speed Plant Construction

Lift trucks played an important role during the construction of the Yale & Towne Manufacturing Company's $2.5-million west coast plant at San Leandro, Calif. Especially when it came to installing equipment and putting the finishing touches on the interior of the 100,000-sq.-ft. facility. Time savings ranged as high as 85%.

Like to know some of the ways Yale & Towne used the trucks? Here are several. They should give you some ideas on how to cut costs when you build a new plant or modernize your present one.

Ten-at-a-time handling of Hauserman partitions simplified the completion of the 6000-sq.-ft. office area. Altogether 200 feet of these movable partitions were used. Sections were stored in convenient locations, then moved to the point-of-use by a Worksaver lift truck.

In place in minutes is the story of this 6000-lb. table for an automatic continuous welder. Same was true of other heavy machinery, thanks to a 6000-lb.-capacity lift truck. Using skid and rollers, it would have taken a half day to move the table from the plant door to its permanent location 300 feet away.

Several days were saved while installing glass fiber ceiling panels and metal dividing strips in the office area. Two crews of two men did the complete job in a week and a half. Saved time through the mobility afforded by the truck-supported work platform. Same working arrangement hastened installation of lighting fixtures and bus duct.

A half hour per unit was all the time required to completely install 600-lb. circulating heaters and bulky lighting transformers. Contractors estimate this represents only 15% of the time required to accomplish the job with a block and tackle. For installation, each unit was placed on a skid-mounted wooden crate. Then the lift truck hoisted workman and equipment into the exact position.

Workers Stay Cool to Profit Sharing

Here's the latest word on profit sharing in 51 experienced firms, the report of a recent study by the National Industrial Conference Board (New York). Of 51 companies, 36 offered their workers a share in profits as a non-unionized company program. And of those 36, eight found their unions aren't at all sold on profit sharing.

• Proof: In these companies unions

bargained members out of existing profit-sharing plans in favor of other benefits.

• Reasons: Fear that the cash bonus will be used to forestall bargaining and might be made a substitute for "fair" rates. Also, fear that employees will get inadequate coverage in the deferred-plan profit sharing, which is usually offered as a substitute for a conventional pension plan when smaller companies are involved.

• Summing up: According to NICB's findings, there's probably no reason to let publicized profit-sharing talk drive you to defensive maneuvers just yet.

BIG CONVEYOR CUTS 9 MILES OFF RAIL TRAVEL

Here's Interlake Iron Corporation's new suspension-bridge conveyor system spanning the Calumet River just south of Chicago. Besides bearing coke across the river from the company's coking facilities to its blast furnaces, the bridge supports gas and steam pipes, too. Bridge has 130-ft. clearance (enough for most ocean-going vessels) and is part of the $35-million modernization program at Interlake. New conveyor is two-thirds of a mile long. Replaces a 10-mile railway route coke used to travel.

Halves Labor, Bans Hazards

The man in this photo is feeding aluminum chloride catalyst into a sealed hopper. Sounds simple—and is, now. But the combination of corrosive fumes from hydrochloric acid plus the aluminum chloride used to mean hard labor for two men in an explosive, congested area.

The scene is Koppers Company's Port Arthur (Texas) plant. Formerly, the two men wrestled heavy drums of the chloride into position over a bumpy, acid-proof, brick floor. The weight of the drum together with the various hand wheels and ratchets used to position it safely made the job hard and disagreeable.

Revolvator Company (North Bergen, N. J.) came forward with its Go-Getter Electric Liftruck to solve the problem and make the job a one-man operation. The truck is powered for both traction and lift, is fitted with a special drum-dumping mechanism having an anti-kickback device. This keeps the drum under one man's constant control.

Also the unit has a special explosion-proof construction including enclosure of electrical system. Capacity of truck is 750 pounds. Cost was $4662 plus battery and charger (which added another $695).

Hot Blast Tests Rocket Material

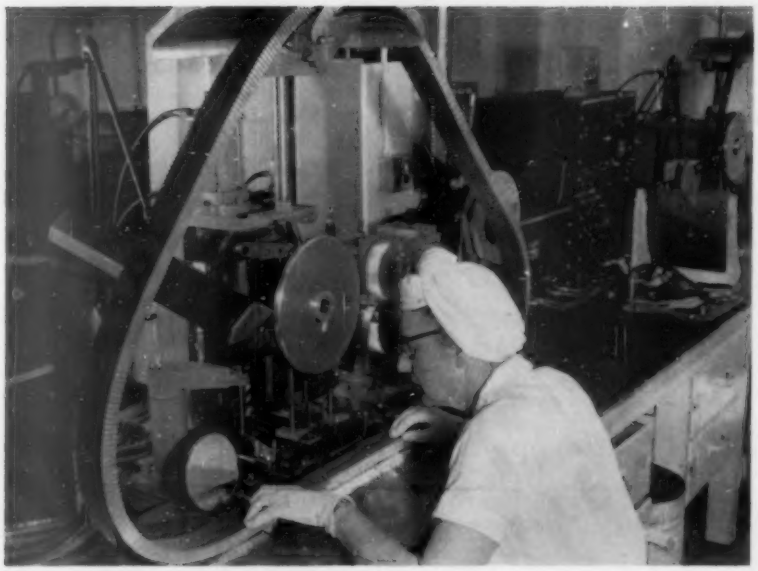
This jet of fire has five times the speed of sound. Its temperature is 5000° F. It's part of National Carbon Company's test of a new graphite compound that will help future rockets blast off into outer space. So far National Carbon (New York) has boosted the life expectancy of graphite to 10 times the previous normal with this new compound.

Normally graphite will burn up in 8 seconds when subjected to this kind of heat. This new graphite-base material lasts almost a minute and a half. Research like this is pointing the way to a whole new family of high-temperature materials for industrial and military equipment of the future.

Puts the Finger on New Managers

When you need a new supervisor in the plant, you usually need him fast. "But that's impossible," says the personnel department. "It will take months to find the right man to fit your description. Even then we'll probably have to train him up to your specifications."

Kaiser Aluminum & Chemical Corporation is no exception. It needs supervisors when it needs 'em, too. But it has some cards up its sleeve. MIDP cards, they're called.



FORMS METAL RIBBON INTO HONEYCOMB CORES

This machine at Solar Aircraft Company (San Diego) transforms foil-thin metal ribbon into strong, lightweight honeycomb material. Forming rollers (at right) first corrugate strip from $\frac{3}{32}$ to 2 inches wide, 0.001 to 0.006 inch thick. Then it's welded layer by layer onto the circling loop of completed core. From one to four slim, specially designed, needle-like welding points make as many as 240 resistance welds a second. Took 6 years to research and develop the machine.

Stands for "management inventory and development program."

The cards are 8x10½ Keysort (Royal-McBee Corporation) cards, one for each manager in Kaiser's far-flung operational empire. On the card, and punched in the sides, is his personal, professional, education, and work history. Need a maintenance manager for a plant in Virginia? Has to be an EE with 10 years' maintenance experience? Needs specific personal qualities? Zip, zip, zip through the Keysort deck, and Kaiser's MIDP office finds your man—maybe in California.

Where do the cards come from? From a 9-step procedure that starts all the way down the line, culminates in central staff records. Here's how supervisor John Doe's card gets to the central service group:

1. Local management, at John's plant, decides who should be included in the MIDP survey. Details a duly appointed representatve to handle all details. Total figures show that 5% of the reserve pool are executives, 60% middle management, 35% first-line supervisors.

2. All people in the program, including John, attend training classes or informal discussions, thus become familiar with the MIDP plan.

3. Then John fills out personal history and position description forms. Forms tell his background, education, experience; nail down description of his present job. John discusses position description with his boss, gets his approval.

4. An appraisal committee made up of John's immediate boss, his boss's boss, and a "neutral third party" who knows John and his work, reviews this material. Each man on the committee appraises John's performance, ability, and potentials. They do this separately, do not compare notes until later.

5. The appraisal committee next meets to discuss individual and group appraisals with John. A recording secretary (someone cleared for this type of confidential job) takes down their observations. Rough copies of the appraisals made before this meeting are burned.

6. The committee compiles a list of development ideas for John.

7. After John and his boss discuss the consolidated performance appraisal and the suggested plans for John's development, a detailed development plan is put in writing by John's boss.

8. Pertinent paperwork is distributed to parties concerned. Central Management Services makes up Keysort card from data on forms, files both for use in the event of a management opening John can fill.

9. John's records are re-appraised annually or within 6 months after he changes to a new job. Line managers send re-appraisal data to the MIDP staff. The staff studies all new and updating information, takes action when necessary.

For instance, one superintendent's appraisal said he was a very good man, but misplaced. Suggested he would probably be better in a staff position because of personality conflicts. The MIDP staff sent a note to the division head assuming the division was on top of it and working on it. But MIDP also looked for a place to move the man and for someone to fill his job.

This kind of policing can save a lot of good men, the MIDP people point out. If management is forewarned of such problems, there's time to find the right slots.

This doesn't mean the MIDP staff assumes line responsibility for placement, development, or morale. It's a service, designed to help the line do a job that rightfully belongs to operating management.

Source: W. A. Borrie, Director of Management Services, Kaiser Aluminum & Chemical Corporation, Oakland, Calif.

This New Carrier Cuts Workforce 87½%

This maze of wiring is part of the central nervous system for the F8U-1 Crusader jet that Chance Vought Aircraft, Inc. (Dallas), builds.

Chance Vought used to have a

YOU BE THE ARBITRATOR

THE CASE OF

The "Responsible" Worker

Out of the experience of the American Arbitration Association

When a job evaluation plan was set up in the machine shop, every operation was examined and rated. Points included in the rating were degree of skill, hazards, responsibility for equipment, and other factors. A "point value" was placed on each item, and the total value determined each job's pay rate.

Things went smoothly for a while. Then a story in the company house organ pointed out a certain machine cost over $20,000. This gave the shop steward an idea.

"This operator's job was underrated on the 'responsibility' factor," he argued. "According to the job evaluation plan, it was figured that damage to the machine due to operator carelessness might cost as much as $1000. Now we find out there's a lot more involved. This job should be given a higher point value and a higher rate of pay."

Management didn't agree. "If anything, that job was over-rated," said the industrial relations manager. "Our experience shows actual damage has never exceeded $500."

Since no agreement could be reached on the union's demand, the case eventually went to arbitration. Suppose *you* were the arbitrator. How would *you* rule?

For the actual decision, turn to page 154

problem when transferring wires from harness boards to aircraft bodies with chafing and bending. Now this one-piece harness carrier provides the answer. Lets two men do a job that formerly took 16. It's made of 2½-in. aluminum tubing, weighs only 75 pounds, despite its 32-ft. length. As for the wires themselves, there are 400 of them in a 40-ft.-long maze.

Once the harness is complete on a board, the wires are transferred to the carrier's contoured shape and fastened by rubber straps. The carrier is then lifted by electric crane from the board and rolled on small wheels to the assembly line. Here the wiring is installed in the plane fuselage (photo).

Contoured shape of wiring on carrier means there's little change in shape as wiring goes into plane.

No Space Wasted Here

Elimination of aisles adds 50% more stock, cuts handling time 60% in this outdoor storage yard at the Peterson Company (Denver). Responsible for these savings is a mobile storage technique that makes for simplicity and easy accessibility.

Peterson's new storage system uses special 6-ft.-long, four-wheel mobile bases or dollies. These dollies rest on steel track anchored to the yard floor. Peterson has 11 units placed side by side with only 3 inches clearance. Each row supports a stack of 12-ft. lengths of safety grating.

When a section of grating is needed, one man pulls the right dolly out of line onto a protruding length of track. This lets a fork truck approach the stack and select just the right type of grating. The units, designed by Dolin Metal Products Inc. (Brooklyn), support loads up to 4000 pounds.

Cafeteria for Free?

Good cafeteria services for employees with no expenditure for equipment? Sounds too good to be true. But that's just the way it's done at a Minneapolis-Honeywell Regulator Company plant in the Los Angeles area.

What's the catch? The State of California provides the facilities operated by handicapped persons who would otherwise be public charges. Company supplies space and utilities only. Applicants for the cafeteria jobs are screened by the state, then interviewed by a committee made up of state, vendor, and company representatives. Result is that workers hired are high caliber men and women.

However, there's one hitch: You must have enough hungry workers to support at least a half-time operation. If your company is outside California, you'll have to sell your state on this program. Refer them to California. It's saving the state money there.

Taped Messages Speed Service

Perforated tapes transmit and receive messages in Babcock & Wilcox Company's new electronic communication system. The system links 17 Tubular Products Division plants to district sales offices over a 3824-mile network, gives customers the fastest service possible.

Similar to a news wire service, the closed-circuit network reaches many points simultaneously, makes duplicate copies of sales information, thus eliminates costly time lapses and

paperwork duplication. Orders sent by any district sales office are received at the rate of 75 words per minute. The taped message is automatically and simultaneously typed as it is received. To get additional copies of data, all Babcock & Wilcox has to do is re-run the tape. After an order is filled, tapes are placed in the office files.

Girl at Work

What's this blonde doing? She's the nerve center of a new system for controlling parts as they move through production at the Dalmo-Victor Company. The young lady gets 60 calls a day from seven shop load coordinators who report intra-shop movement of parts.

Before the system was set up roughly 3 man-hours a day were spent hunting for lots of parts in the shop. The new system was cheap to install—about $18. It's tied into the company switchboard but operates as an independent intercom system. Monthly rental is $12. Thus it pays its own way in the first few working days of the month.

Step by step, here's how the system works: As each lot arrives at a shop section, a coordinator notifies the clerk via a special phone connection. She fills out a central control card with the essential information, inserts it in one of seven control books. This way, production control has a record of every single part at all times. If a part must be located, its whereabouts are known in an instant. Each control book holds 122 cards, so there's space to keep track of 850 lots of parts at one time.

Source: Robert Le Doux, Production Control Manager, Dalmo-Victor Company, Belmont, Calif.

Cuts Piping Cost

Now cost of constructing underground steam lines can be halved, thanks to a new method of construction. Jointly responsible for it are Consumers Power Company (Jackson, Mich.) and Badger Manufacturing Company (Cambridge, Mass.).

Big saving comes from elimination of costly concrete conduit and manholes. Installation is as simple as this: Trench is dug, then pipe is laid. Pipe anchor, guide, and support installation follows. Finally line is packed with granular poured-in-place hydrocarbon insulation.

As the line heats, the insulation cures to a three-layer protective and insulating covering. An 8-month test by Consumers' steam heating department proves the usefulness of the new method.

Safety Showers

This shower fixture may look out of place, but it isn't. It's Du Pont's way of protecting lab workers who may be splashed with corrosive chemicals. A flip of the valve turns on the shower, removing chemicals from the skin and clothing. This installation, at the Chestnut Run (Del.) Electrochemicals & Pigments Technical Service Laboratory, is one of 43 such safety showers. Each cost about $80 to install. Footnote on Du Pont's safety program: Because such accidents are infrequent, lab has no floor drains.

CASE BOOK CAPSULES

Latest disposal idea for radioactive waste is to dump it at sea. Atomic Energy Commission will license American Mail Lines to carry up to 15 pounds of "packaged" wastes for disposal at least 150 miles off the continental shelf.

Charge plates saved time for visitors and exhibitors at American Society of Tool Engineers' recent Los Angeles show. Each visitor received a metal plate with his name, address, and company.

Vapor-gas cooled and insulated power transformer (7500-kva.) was energized recently at Havre de Grace (Md.) substation of Baltimore Gas and Electric Company. Westinghouse Electric built it.

A new language using Arabic-like numerals is designed so distribution of magnetic ink produces a unique signal for each character. Developed by A. B. Dick Company (Chicago) for high-speed sorting and accounting machines.

Remote controls in an observation bunker raise, lower, rotate, and change stream widths of automatic fire-fighting units at Cape Canaveral. Akron Brass Manufacturing Company (Wooster, Ohio) developed the units to minimize equipment and instrument losses.

Huge pressure vessel closure was pressed in one stroke from a flat, 58,646-lb. circular plate at Babcock & Wilcox Company (Barberton, Ohio) for Con Edison's nuclear reactor vessel.

Time savings and increased accuracy in billing resulted from use of an IBM 632 Electronic Typing Calculator at Barclay Knitwear Company (Kingston, N. Y.). This unit combines electronic calculating and electric typing.

Nuclear radiators will soon be used for gaging on foundry cupolas at the Whiting Corporation (Harvey, Ill.). Nuclear Corporation of America developed the units using pellets of Cobalt 60.

TAKES THE BACKBREAK OUT OF A HEAVY JOB

And that's important when you're loading 30- to 40-lb. pieces of clipper knife steel on a milling machine bed all day. This amounts to 12 tons of material handled daily by the machine operator (photo) at John W. Bolton & Sons, Inc. (Lawrence, Mass.). It's a tough job any way you look at it. But by keeping top of supply pile at normal working level, operator-controlled lift table eliminates back-breaking bending, reduces operator fatigue. Average load for the table (Southworth Machine Company, Portland, Me.) at this operation is 3000 pounds, but it can handle up to 7500.

Found: a Third Hand

A badly needed third hand unloads press brake parts at Westinghouse Electric Corporation's Athens (Ga.) plant. Installation of the iron hand has resulted in increased production, lower cost. And has also increased safety for the attendant, who no longer reaches under the die area to unload parts.

Mild steel frames being unloaded automatically here (photo) are 9 inches wide, 32 inches long. After frames are formed the jaws of the iron hands (Sahlin Engineering Company, Birmingham, Mich.) grip them at two points, swing them out of the die area, stack them beside the machine. The swinging arms then move back into position ready for the next part. Installation requires no additional floor space.

Workers Speak Up About Their Unions

Wages, prices, and unions were the subjects of a recent questionnaire of Congressman Charles E. Chamberlain. About 10,000 Michiganites from the state's sixth congressional district (Detroit and vicinity) answered. Roughly 40% were hourly wage earners. Here's what the congressman sees in the returns:

"I sense a desire on the part of the union man to assert himself as an individual. He recognizes certain defects in unions as they exist today and believes there is need for some corrective legislation. He wants a good union to be proud of. In some instances, I believe he feels his union has grown away from him . . . thereby losing touch with the individual and his attitudes. He wants most to work . . . definitely not to strike. And he wants to hold the line on wages and prices."

To support Congressman Chamberlain's conclusions, look at the sample results that follow. Surprisingly, they show how closely the hourly wage earner's attitudes agree with those of the general public on questions vital to him.

Here are three typical questions in the survey, with answers given by all respondents and by hourly rate workers only:

1. Do you favor holding wages and prices as much as possible?

	Yes	No	No Opinion
All	86%	4%	10%
Hourly	82%	4%	14%

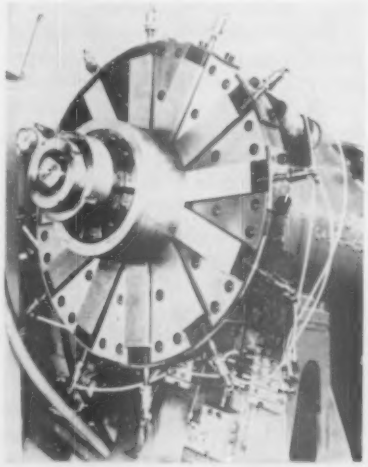
2. Do you believe policies that have been adopted by union leaders represent the thinking of rank-and-file union membership?

	Yes	No	No Opinion
All	10%	77%	13%
Hourly	16%	70%	14%

3. Should labor unions be made to file financial reports?

	Yes	No	No Opinion
All	95%	3%	2%
Hourly	94%	4%	2%

These subjects have received heavy national publicity—newspapers, magazines, radio, television, etc.—in the last few months. Workers are well informed as a result. The implication for your plant: Well-informed hourly workers draw the same conclusions as other people, even on matters directly affecting them. Ask yourself these questions for self-analysis: How's your communications program? Do you forthrightly step into controversial issues, state your position?



New Lube Tube Cuts Friction

Flexible polyamide tube helps solve a difficult high pressure lubricating problem on sizing machines at Grotnes Machine Works, Inc. (Chicago). Metallic-base grease reaches just the right load-bearing surfaces via flex-

ible tubing at 400- to 600-psi. pressure, reduces friction losses by 50 to 75%.

The two major friction areas in the sizers are between the drawbar cone and the work jaws, and between the work jaws and the support table. Grotnes engineers use up to 30 two- to four-foot lengths of Nylaflow tubing (The Polymer Corporation, Reading) to keep these areas lubricated. The tubing has a short-time burst pressure rating of 2500 psi., holds its position firmly between connections (whether pressurized or not) without support. The translucent material presents a neat, clean appearance. At the same time, the operator can make a visual check of lubrication flow.

NO-HANDS LOUVERS MOVE WITH THE SUN

And the setting won't have to be changed for 150 years. These 14-ft.-tall aluminum sun louvers on Reynolds Metal Company's office building (Richmond, Va.) insure pleasant conditions for workers. The 880-louver system shades two walls. A complex program control system installed by Lemlar Manufacturing Company (Gardena, Calif.) governs position changes to keep louvers ahead of sun's movement. Seasonal corrections are made automatically by master clock adjusted until the year 2100. And there's a special automatic adjustment, too, for cloudy days.

Two-Bit Leak Plugger

A pipe-fitter who kept his eye on the ball—any ball—recently picked up a $1000 suggestion award at Cadillac Motor Division of General Motors Corporation (Detroit). His ingenious new device plugs leaking plating tanks. Saves Cadillac many gallons of costly plating solution whenever shutoff valves act up.

At one time, there just wasn't any way to plug up the leaks. Experiments started with rubber plugs, suction cups, and plumber's test plugs. But none worked. Then the search continued in drug stores, hardware stores, dime stores, and sporting goods stores for just the right-size plug or ball.

The search paid off with a 25¢ rubber ball that's placed on the end of a 7-ft. rod between two metal disks (photo). When this goes into a drain opening, the ball compresses between the disks, forms a tight seal when the rod is turned.

Group Action Spurs Small-Plant Safety

Best way to improve the safety record of your plant—especially if it's small—is to lean on the services and facilities of your own trade association. The National Safety Council (Chicago) estimates that entries for annual safety merit awards by associations represent 20,000 firms employing a total of 2-million people.

Here's what associations can do for their members' safety:

. . . *Combine knowledge through meetings, pamphlets, letters.*

. . . *Spur competition among their members.*

. . . *Stimulate good record keeping.* Needn't be elaborate, but accident control depends on analysis, which is possible only through records.

. . . *Work with suppliers of equipment.* Aim: Improve safety of the equipment through better guarding, design. One customer's voice is always amplified if it is part of a bigger chorus.

Now read on for five short case histories of successful association safety efforts:

• The National Tool and Die Association is a typical small-business association. Has a membership of 1103 companies employing 30,000 persons. The association puts emphasis on promoting eye protection, has regular instructional meetings, distributes safety literature and membership reports. It was able to reduce the accident rate among its membership by 35% in five years.

• Pennsylvania Manufacturers Association, in cooperation with member companies, last year set up a back-to-school program for over 1000 foremen. Purpose was to help the foreman analyze accident causes, spark enthusiasm among his workers, conduct inspections, use adequate first-aid methods. Material was presented in 16 monthly classes. The last six stressed human factors in safety.

• Mississippi State Manufacturers Association sponsors a governor's safety conference, safety contests, foreman training courses and incentive plans.

• The Milk Industry Foundation used organized safety contests as a strong incentive, promoted the wide-

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spread use of booklets and safety training aids among its member companies. By these means it achieved a significant decline in the rate of vehicle accidents.

• The American Warehousemen's Association made a survey in 1955 to get injury facts and determine if they warranted a full-fledged safety effort. Published figures triggered member interest, started a well-organized safety effort.

And if it's proof you want, look at these five examples:

• Can Manufacturers Institute helped reduce frequency rates in the industry 50% in five years. The 1951 frequency rate was 12 accidents per million man-hours. The 1955 rate was 5.9.

• The Manufacturing Chemists Association cut its frequency figure 33% in a five-year period—from 4.8 to only 3.2.

• The National Gypsum Association helped cut the frequency rate among members by 45% in four years. Its main procedure is constant activity of subcommittees.

• The Portland Cement Association achieved a 37% reduction in a recent five-year period. Its frequency rate was a low 4.2 in 1951. And it was shaved still further to 2.6 in 1955.

• The Institute of Scrap Iron and Steel, representing a particularly hazardous industry, almost halved its frequency rate from 97.3 in 1954 to 47.3 in 1955.

Source: Clyde F. Schlueter, Accident Prevention Manager, Employers Mutuals of Wausau (Wis.).

Sign of Pride

When you build a new building or improve your plant, you put a sign out to tell passers-by about it. Any reason why the sign can't identify your company, your product, in an interesting way?

Pitney-Bowes Inc. (Stamford, Conn.) makes postage meters. And the sign the company put on its new building in Richmond (Va.) looked like a king-sized letter (photo). Said the local *News Leader*, "It illustrates the company's business and credits everyone concerned." Why couldn't you have your sign look like the product you make?

Reads on the Road

The man in the car isn't listening to music. He's "reading" his office mail. He's Philip H. Ordway, president and general manager of Union Steam Pump Company (Battle Creek, Mich.). During the day, his secretary opens his mail; digests most letters, reports, articles; tapes the information on a Dictet (Dictaphone Corporation) battery-powered voice recorder. Ordway listens to the machine while he drives to and from work. Neat trick saves him one full hour each day.

You, Too, Can Counsel

"Emotional difficulties are most frequently at the bottom of poor performance on the job and it's generally up to the supervisor to provide first aid through skillful counseling," says Dr. Phillip A. Goodwin, lecturer in psychology at the University of California.

Sound like a tough job? Well, to help out, Dr. Goodwin gives these three rules for successful counseling of the unhappy employee:

• Convey a feeling of sincere interest and understanding, but not sympathy. Sympathy often gives the worker a chance to avoid facing the real problem.

• Don't give advice. It implies smug superiority—ability to run another person's life. Also tends to prevent the worker from asserting his own maturity.

• Refer serious emotional problems to professional help. This may take some persuading, but when all points are considered it's the only sound solution.

Dr. Goodwin adds a word of caution to the would-be employee counselor, too. You can't succeed if you are not genuinely interested in your employees. Just forget the whole thing if better production is your only interest.

Scrap Gets the Bright Light

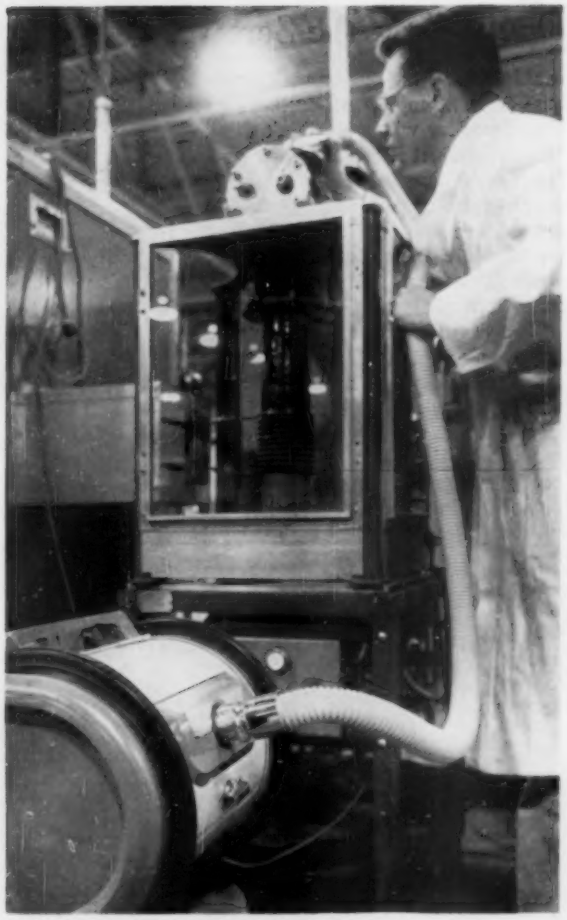
Ever hear of 200 foot-candle lighting for sorting scrap? General Iron & Metal Company, Inc. (Chicago), is reaping handsome profits with bright lights in its scrap-sorting warehouse. Customer complaints are down, worker morale and productivity are up, and working conditions are more pleasant.

Company buys scrap copper alloys and other metals—mostly from screw machine plants. Sorts it for resale to smelters, refineries, foundries. Prices received for scrap depend on accuracy of sorting that's done largely by visual inspection.

The lighting system uses Power-Groove fluorescent lamps (General Electric Company) mounted in rows 12 feet apart and 13 feet above the floor. Where inspection is most critical, light level is 200 foot-candles. In less critical areas, it's 180 foot-candles.

GLASSWARE WASHING GOES AUTOMATIC . . .

INVESTMENT CASTING USES ROASTERS . . .



VACUUM PREVENTS SHORTS AT PRESS.

Home Products Solve Plant Problems

One way to make sure your products work is to use them. And Westinghouse Electric Corporation managers claim the products in the photos above work fine. But in ways slightly different than those they were designed for. To learn how your wife's new appliance may solve a plant problem, read on.

No dishpan hands—This dishwasher (photo) found a home in the Westinghouse semiconductor plant at Youngwood, Pa. Cleans beakers, jars, petri dishes, and other glassware used in processing silicone and germanium wafers for semiconductors. Does day-to-day washing economically. Formerly glassware was washed by hand. New method saves time, eliminates dishpan hands.

Good enough for turkeys—Investment casting wax has to be kept molten—at just the right temperature. So why not an electric roaster? Works for turkeys. And it works fine at Westingnouse's Blairsville (Pa.) plant, too. Here Westinghouse makes small cast parts such as gas turbine blades.

In this operation (photo) several wax molds of the part to be cast are joined to a central core. This is done by dipping one surface of the mold in molten wax prior to joining. Next a sand slurry is poured around the wax molds to harden. When hard, wax is melted away and the sand mold is ready for use.

Mops up dust—That's a vacuum cleaner you see in the photo. It keeps dust particles and other impurities out of germanium and silicone used in the manufacture of transistors. Does this by keeping processing furnaces free of contamination. The cleaner's flexible hose connection makes it easy to reach down inside a 3½-in.-diameter quartz furnace tube. This tricky idea is also a product of Westinghouse's Youngwood plant.

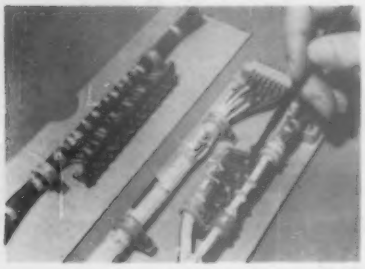
Quick brush-off—Small scrap slugs from small motor lamination punching operation were a quality problem. They crept between motor laminations and caused short circuits that required costly rework. To solve the problem, plant men at East Springfield (Mass.) attached a Westinghouse canister-type vacuum cleaner to the press, connected its hose to a funnel directly under the die. This provides continuous suction, pulls the scrap slugs from the die. By installing the cleaner vertically, gravity helps slugs pass directly to a waste bin. Thus there are no vacuum bags to empty.

Don't Scrap the Scrap

Making scrap handy for tool proofing is such a simple, cost-cutting idea you'll wonder why you didn't think of it before. At Ryan Aeronautical's San Diego plant, the idea is saving considerable time as well as material in the tool manufacturing department. Here they use quantities of sheet stock for proofing tools on try-out punch press runs.

The way Ryan does it is route all usable sizes, types, and gages of scrap to salvage. The material suitable for tool proofing is accumulated in a special area near the try-out press. Is instantly available as needed without red tape.

To obtain sheet stock in the past involved requisitioning new material from raw stores. After getting the requisition approved, the material went to the cutting and form department for shearing. Then was delivered. Whole procedure took close to an hour each time a tool had to be proofed.



Speedier Soldering

Printed circuits for terminal boards have cut soldering time at Boeing Airplane Company (Seattle). New insulating terminal boards (left) have interconnecting circuits already printed on them. Each wire feeds through its appropriate hole and is quickly soldered from the opposite side of the board. And when circuits have to be reworked, man-hours also show a drastic reduction. In the old method (right) missile subassembly wires were soldered to terminal pins.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

Wire Racks Cut Sorting Time 75%

Picking just the right wire for electrical harnesses is now done quick-as-a-flash at Ryan Aeronautical Company. New finger-rack wire holders (photo) are the reason why. In past days, assemblers spent excessive time sorting and searching for the right wire. That's when wires came in coils, were hard to finger through.

Right then and there Ryan production men got busy figuring out a way to reduce man-hours wasted as operators hunted out the right wire from the maze. They hit on this finger-rack. Now wires are sorted only once. Searching and sorting time is reduced 75%. Over-all make-ready time savings per harness wire run about 0.048 man-hour.

Racks are movable, will fit into a hand-truck dolly. They have a flat 20-in.-square floor plate for stability, are made of $\frac{3}{16}$ths round stock welded into a ½-in. wide cross bar. The pedestal upright is a hollow column formed by welding two 6-in. wide channels together. Height is just right for comfortable sitting reach, and a 15-deg. tilt makes for easy loading and unloading. The new racks weren't expensive; cost about $20 each.

Source: Alan G. Dimond, Supervisor, Inspection Department, Ryan Aeronautical Company, Torrance, Calif.

YOU BE THE ARBITRATOR

Continued from page 148

The award—The arbitrator ruled in the company's favor. He drew a distinction between "probable" damage and "possible" damage. While he admitted that it was possible for many thousands of dollars worth of damage to be done, he said that past practice showed "probable" damage was within the limits indicated in the original job evaluation plan. "The evaluation of the responsibility factors must deal with the normal, not the abnormal situation," the arbitrator concluded. "Here the ratings are properly based for these factors on normal expectation. And they are supported by the evidence of experience."

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Machines Take a Rest in Plastic Tents

When it's vacation time at John Kinkel & Son (Union City, N. J.), workers cover mill machinery with protective polyethylene film tents. Tents, fabricated by Commercial Plastics & Supply Corporation, New York, protect needle beds and the 2588 needles in each machine from moisture. Each machine's value is between $12,000 and $15,000.

Old way of doing the job was with Kraft paper covers. But the paper absorbed moisture, tore and disintegrated easily, thus exposed delicate machines to rust damage. Kinkel reports the tents are re-usable and cost is low.

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AUTOMATIC ELECTRIC

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How one company used the broad approach to get

THE PROBLEM
Up to now, your process has used a single-rinse set-up with raw water feed. Your chemist now tells you you must use deionized water.

THE QUESTION
What size deionizer do you need?

TRY THE NARROW APPROACH: Study the immediate problem.

CASE 1—Single rinse, raw water (no change)

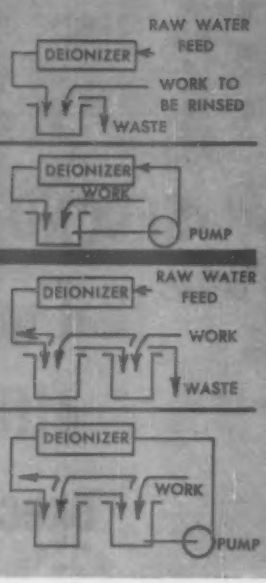
CASE 2—Single rinse, recycled water

TRY THE BROAD APPROACH: Study the whole process.

CASE 3—Double cascade rinse, raw water

CASE 4—Double cascade rinse, recycled water

TAKE A SYSTEM



So You Think You Know the Whole Story

Then here's news for you—and all other water users. It's a new approach to measuring plant water costs—and a key to savings you'd never think possible.

WATER IS A PROBLEM for nearly every plant. And that's just where trouble lies. Why? Because many plant operating executives don't even know they've got water problems. And because many of those who do know make the mistake of thinking their problems are simple—and can be easily solved.

Fact is, water doesn't present many problems that are really simple. And (as the problem-and-answer panel above shows) the simple answer is seldom the best answer.

For example, suppose you need more water. What do you do about it? Probably your first impulse is to make your inlet pipe bigger or boost water pressure. This solution may be fine—may pay off to your satisfaction. But is it the best way to approach the problem?

By A. KENNETH GRAHAM, President, and H. L. PINKERTON, Chemical Engineer, Graham, Savage & Associates, Inc., Jenkintown, Pa.

We'd say no. A narrow approach may answer your immediate problem, but it won't assure you of finding the best answer for the long run. Maybe you don't even need water at all. Maybe you can change the process so you can substitute thin air for water. Whatever the solution, it's a better, more reliable solution if it's the result of a studied, completely analytical approach—a broad approach.

Nearly every manufacturing plant in the process industries has had a process-water problem at one time or another. Even those plants fortunate enough to have missed this experience may expect to meet a supply problem some time in the course of the next 15 or 20 years.

During that period, it is estimated, the national demand for water will double. Demand will approach the total available supply. Then you can expect a supply problem that is general rather than local, as in low-rainfall areas.

MAIN TROUBLE AREAS

Here are four kinds of process-water problems to watch for:

Supply—It may be inadequate in volume, not pure enough, or both.

Costs—They may be high because of wasteful use of water—or because other values are being lost to the sewer with the waste water.

Effectiveness—For any of a number of reasons the water may not be performing its intended function.

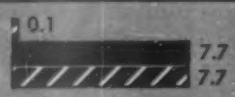
Disposal—The volume of waste may be so high that the receptor system is overloaded—or the waste itself may be contaminated in a way that makes it unacceptable in the receptor system.

TWO APPROACHES

Two general methods of approaching a process-water problem are:

Narrow approach—This is a "frontal attack." You set up the problem in definite terms, then

the best answer to its water problem

PLOT THE RESULTS AS RATIOS (□ = 1)	EVALUATE THE RESULTS	PICK YOUR BEST SYSTEM
	This solves the immediate problem without thinking at all.	No. This system would take a deionizer 45 times as large as in No. 3.
	This is better, but still is a narrow approach to the problem.	No. This would take a deionizer 7.7 times as large as in No. 3.
	This looks like the best bet as determined by a study of both rinse and deionizing method.	**Best answer — almost 8 times better than the next best method.**
	If conditions were different, this might be the best method. But as it is, it's inferior to No. 3 above.	No. This would take a deionizer 7.7 times as large as in No. 3.

Relative amount of raw water used, in gallons per minute. Relative size of deionizer (equipment cost) in cu. ft. Relative cost of chemicals for deionizing, in dollars per day.

About Your Water Costs

knock it down by proceeding directly against it. For instance, if the city cannot furnish enough water through the mains, you bring in a new main, dig a well, or pump some water from the river.

Broad approach—This is a "strategic assault." You consider carefully what changes in process will have the most beneficial (or least harmful) effect on the plant economy as a whole—and at the same time will solve the immediate problem, even if indirectly.

The broad approach does not recognize the four-problem breakdown given above. It directs you, if you have one problem that you recognize, to consider all the aspects of water usage. Often, too, the problem lies there unrecognized. For instance, water costs may have been high for years, but if there is no sudden rate change, there's no clear indication of high cost.

The narrow approach will solve the problem effectively. In some cases there is no other answer, and any good maintenance engineer can usually handle the problem. The answer does not ordinarily involve changes in in-plant processes themselves, but rather alterations in the services to them.

Although effective, the narrow answer is not necessarily the best. Often, by tinkering with the production processes, you can not only solve the process-water problem, but also make related gains, sometimes in a startling fashion. To see what we mean, let's study six common water problems:

1. COOLING WATER SUPPLY

Narrow approach—This sort of problem involves consideration of several different angles. If the cooling unit that is not doing its job is new, then the water feed is too litttle and/or too warm; or the process material feed is too fast and/or too hot; or the design was faulty in the first place. If the unit concerned is an old one that has suddenly ceased to perform (while there has been no change in process or production rate), then obviously the solution is to restore the equipment and water feed lines to their original condition, so that they will again perform their duties properly.

Broad approach—It will go further. It will provide against a recurrence of the cause of failure. For example, if scaling is the difficulty, you'll soften the water feed and recycle through spray ponds to minimize the size of softener required. New flowmeters and thermometers on the water side of the unit (as well as on the process side, where it is usual to find them) will provide a control on the efficiency of operation. Proper installation of such apparatus can also serve as a means for speedily diagnosing the cause of any difficulties that are likely to arise in the future.

Turn the page

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2. RINSE WATER SUPPLY

Narrow approach—Simply get more water to the rinse, by one means or another. The difference between this and the cooling problem we have just discussed is that in the process where cooling is required, a definite amount of heat has to be extracted, requiring a definite amount of water to carry it away.

By and large, heat exchangers and similar devices will have been designed to make as efficient use of water as is consistent with economy in the size of the unit. A rinse tank, on the other hand, is usually "designed" by finding some tank at least large enough to contain the work and running a ¾-in. water line to it. If this line turns out to be too small, you make it 1¼ inch.

Broad approach—First analyze the requirements and then design a rinsing system that will meet them most efficiently. For soluble compounds (detergents in laundries and bottling or canning operations; or soluble chemicals from operations in metal-finishing, plating, tanning, and the like), rinsing consists of diluting the offending solution carried by some workpiece to a lower concentration, at which point it is no longer objectionable.

A little attention to the fundamentals of rinsing will repay the effort many times over. Suppose a pint bottle, when drained, retains on its inner walls 0.16 fluid ounce of a solution that must be diluted one million to one before the bottle is suitable for use. If you decide to stick it under a faucet and let the water run, it will require—with absolutely no wastage—220 ounces of water to accomplish the dilution. Instead of this, you may choose to fill and empty the bottle several times. There are several ways you can do this. Here are three:

1. Fill bottle full and drain three times, using a total of 48 ounces of water.

2. Fill with only 5 ounces, shaking and emptying four times, using a total of 20 ounces.

3. Fill with 0.32 ounces, shaking and emptying 13 times, using only 4.2 ounces all told.

Any of these methods represents a substantial saving over the original scheme, but the tale is not yet told. If you have a series of such bottles to wash, you may use the countercurrent principle. Instead of rinsing each bottle four times, say, with fresh water and discarding each rinse, you will use each rinse in four successive bottles. This way you'll be rinsing the fourth bottle with pretty dirty water. So for the second rinse of this fourth bottle you'll move it up to receive a rinse that has been used only twice before. You'll continue moving up this fourth bottle until, for its fourth rinse, it gets fresh water. Now, if each rinse is 5.1 ounces of water (a little more than in No. 2), your bottles will be just as clean as before—but you will

HAGAN COAGULANT AIDS SOLVE COLOR PROBLEM FOR WOOLEN MILL

Slurry-Feeding Hagan Coagulant Aid No. 18 at J. J. O'Donnell Woolens, Inc.

J. J. O'Donnell Woolens, Inc. produce cashmere and high quality ladies woolen goods, specializing in pastel shades. Located downstream of a steel mill, a sewage plant and several other woolen mills, the periodic high organic color and detergent content of Blackstone River water created a difficult clarification problem. Even with heavily increased alum dosages, color removal was poor, frequently necessitating reprocessing.

Over two years ago, the plant adopted the use of Hagan Coagulant Aid No. 18 during periods of high color. Alum dosage has been reduced by 25%, with good floc formation and sedimentation. Color removal is now excellent.

Hagan Coagulant Aids are non-toxic, easy to handle, and produce a large tough floc that speeds settling time and reduces carryover.

Hagan Aids may be dry-fed or slurry fed as desired. Write for Bulletin 410-12-2 for information on the complete line of Hagan Coagulant Aids.

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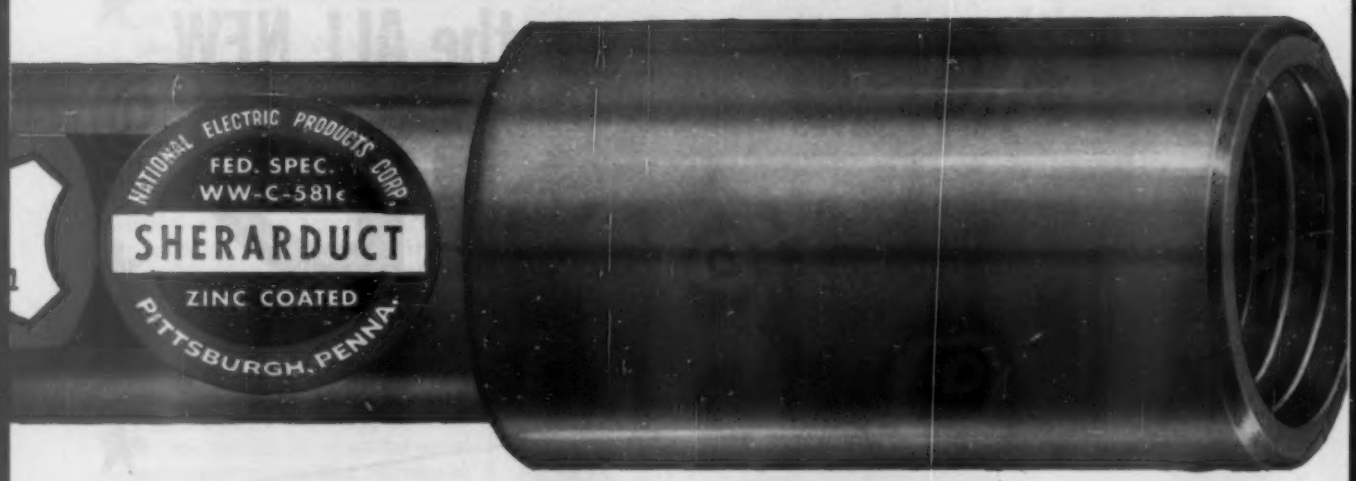

NOW galvanized Sherarduct is coated with NEW

FORMULA MVC-1

the modified vinyl copolymer that provides the most effective barrier against corrosive agents of all kinds

National Electric has developed a new way to combat conduit corrosion. It is called Formula MVC-1, a new modified polyvinyl chloride resin coating that's available only from National Electric.

Here's what MVC-1 does to even further increase the protection against corrosion offered by the Sherardizing process of galvanizing.

RESISTANCE TO CORROSIVE ATTACKS—In accelerated salt spray, sulphuric acid and caustic tests conducted by the Pittsburgh Testing Laboratories, new Sherarduct with Formula MVC-1 far outlasted all hot dipped and other high-grade coated and galvanized conduits tested.

RESISTANCE TO FLAKING—Formula MVC-1 makes a tight, uniform, adhesive coating that withstands bending without cracking or flaking.

TEMPERATURE RESISTANCE—Formula MVC-1 is extremely resistant to high and low ambient temperatures and will withstand the majority of all industrial temperature conditions.

NOW ADD THIS NEW CORROSION RESISTANCE TO SHERARDUCT'S OTHER FEATURES

1. The Sherardizing process of galvanizing that alloys zinc with the conduit walls.
2. Normalized, highly ductile steel for easy bending and threading.
3. Zinc protected threads for complete end-to-end protection.

These are the features that convince architects, engineers and contractors it is best to specify National Electric Sherarduct when real corrosion protection is required. Write for complete information on new Sherarduct today.

Listed by Underwriters' Laboratories, Inc.

Sherarduct *with MVC-1* **is Galvanized Conduit at Its Best**

National Electric Products Corp.

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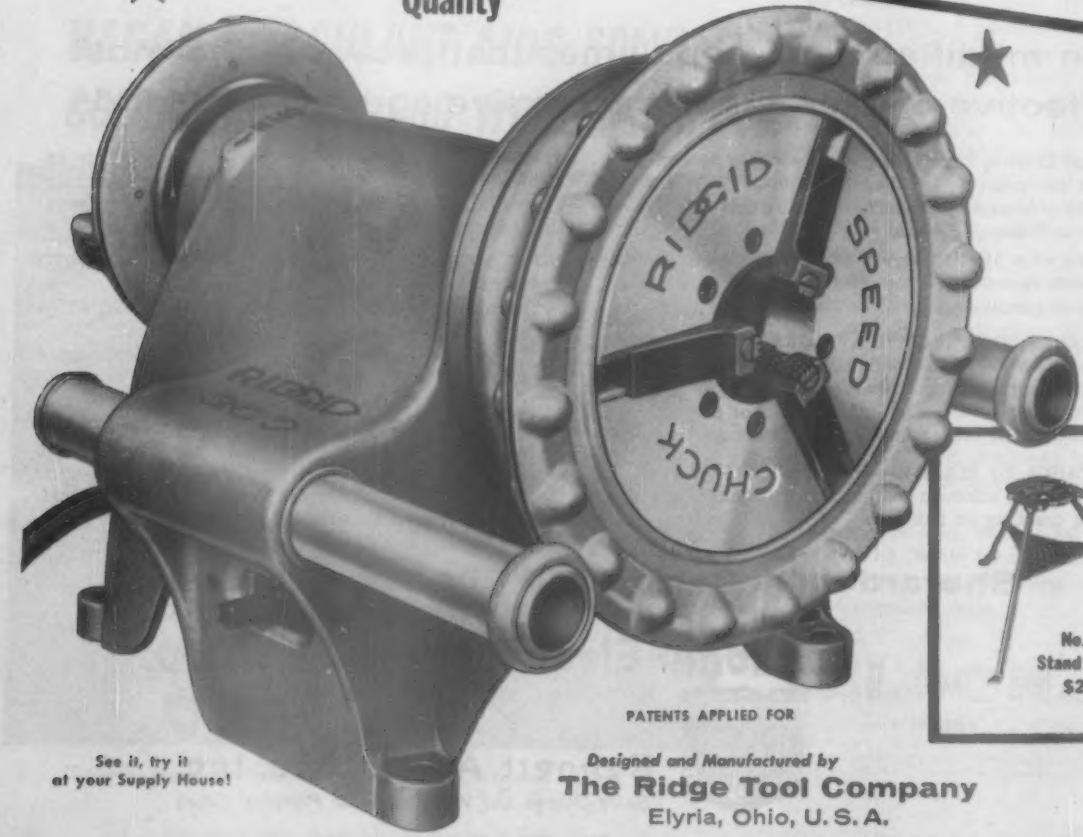

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Designed and Manufactured by
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Begins on page 156

have had to use only one-fourth as much water.

Much the same thinking applies to Nos. 1 and 3. Just how far it may be wise to go along these lines is simply a matter of economic balance between the cost of equipment and the savings in water.

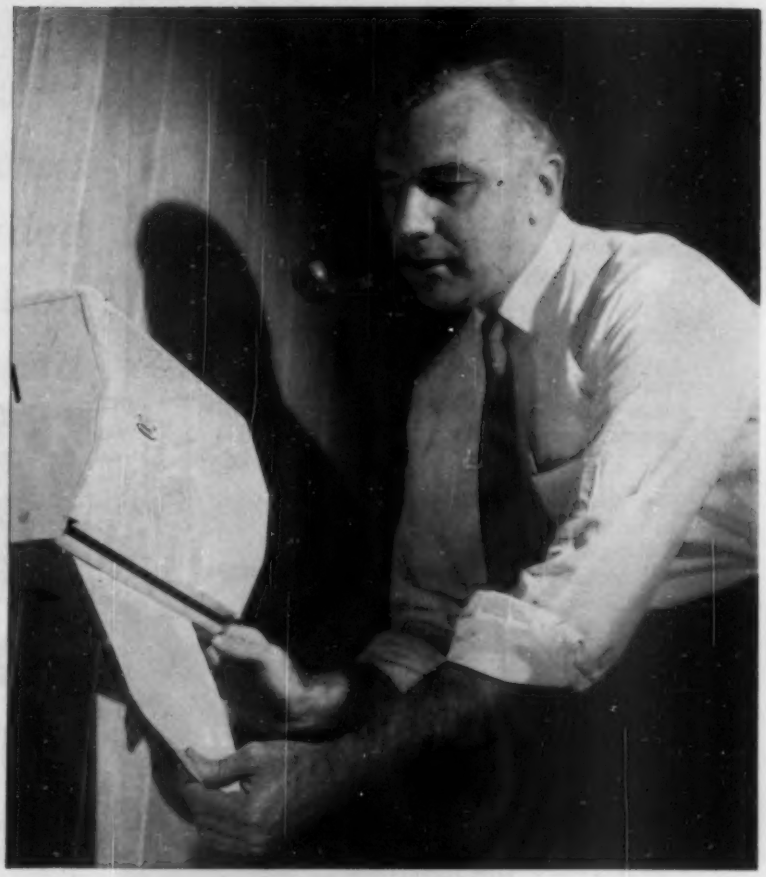
Similar considerations apply when you are rinsing a series of articles by immersing them one after the other (as on a conveyor) in one or more tanks constantly supplied with fresh water. Everyone knows that two flowing rinses do a better job than one and that three are still better. Not every one, however, recognizes that if these two or three rinses are cascaded and *all* the water is introduced into the first, the results for two tanks are about four times as good; and for three, almost 27 times. In general, for n rinses, they will be about n^n times as effective.

Returning to your immediate problem, suppose you have a single running dip rinse, which requires 730 gallons per hour (gph.) of water to obtain the desired quality of work (i.e., by dilution). But for some reason, you get only 200 gph., and work is being spoiled.

Narrow approach—Take the necessary steps to increase the water flow to at least 730 gph.

Broad approach—Install a series of cascade rinses. Two such tanks, each with equal separate feed, will produce the desired results with only 26 gph. each, or 52 gph. in all. But if cascaded, the two tanks will require a total feed of only 26.5 gph. Three tanks with separate feeds will require 8 gph. each, or 24 gph. in all. But if cascaded, they will take only 8.7 gph. Compare any of these figures with the 200 gph. that now seems inadequate, or with the 730 gph. that would be furnished by the direct approach. Such savings are not theoretical or visionary. They have been achieved in actual practice.

When you can't use multiple rinses because of space limitations, a substitute device works fairly well. This consists of over-tank sprays, positioned so that work leaving the tank rises through them. The sprays should be flowing only when work is passing through the spray



Picture of worker saving money

He's helping cut maintenance 50% with Steiner roll towels

Here's why roll paper towels reduce washroom maintenance costs: Controlled roll paper towel dispensers hold more towels . . . in a cabinet of any given size you can get almost twice as many towels on a roll as you can folded. Also, Steiner control cuts towel waste . . . makes supply last longer. Means your roll towel cabinet has to be refilled only half as often as a folded towel cabinet. Saves as much as 50 percent in maintenance man-hours.

Just install Steiner dispensers in your washroom on a trial basis and see how you save. Your local janitorial supplier or sanitary paper distributor can help you. For more information send in the coupon below.

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The rugged durability and extra value (Timken tapered roller bearings in every wheel, spring loaded non-kicking handle, slide planes for easy pallet entry and 360° lifting radius as standard) of the REVOLVATOR Red Giant hand lift pallet truck (above) has built a reputation which means that...
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One of six basic models . . . REVOLVATOR Series 54.00 Go-Getter for use in explosion hazardous areas for chemical and related companies with Class I Group D or Class II Group G hazards designed at the request of one of the country's leading safety authorities. This electric lift truck meets requirements for both hazards and utilizes screw type housings hydrostatically tested to pressures far beyond those required. Additional safety feature—hydraulically operated disc brake.

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YOUR WATER COSTS
Begins on page 156

zone. And if possible, all the water fed to the tank should come via the sprays. Sprays should be so directed that as much as possible of the spray hits the work—and hits it as far above the water surface in the rinse as is practical.

3. HIGH WATER BILLS

Don't spend your water like money. You can always print more money. But when the well runs dry, you've had it.

Narrow approach—Conclude that you're wasting water and take steps to reduce the wastage. You can put meters in each department that is a large user of water and hold the various department heads responsible for keeping the meter readings at a reasonable figure. You can then have your maintenance manager alerted to spot leaks and all wasteful running of water.

Broad approach—Inquire into all process steps using water to see how the job can be done at least as well with less water and how the reduced consumption can be guaranteed day after day. You may recycle cooling water through spray ponds or use it elsewhere, perhaps in a process where its heat values can also be recovered. And, as outlined previously, you can drastically reduce the water needed for rinsing by a slight rearrangement of the process.

Where water is a direct part of the process chemistry, the method of recovery for re-use cannot be so simply stated. It's always possible to purify the effluent water for recycling, but whether it's economical to do so will depend upon the circumstances. The tools available for such purification include various types of filters, with and without the use of activated carbon, deionizers, stills.

Having reduced the water consumption by one or another means, you then have to guarantee that you can maintain the reduced rate without impairment of the proper functioning of the water. The closed-cycle re-use of cooling water means the consumption is automatically restricted to the requirements for make-up. Thus it probably will be necessary to soften the make-up water to prevent scaling. But you'll

Bob showed them a new product that ended rust on work and tools—

STANDARD Special Transparent Coolant

A case story about the Adams Company, Dubuque, Iowa

Before Standard Oil lubrication specialist Bob Wenger told The Adams Company management about Standard's SPECIAL TRANSPARENT COOLANT, there had been considerable trouble with rusting of work and machines in the plant. There had also been trouble with deposits on the ways of the grinding machines. Rust occurring on parts being processed was resulting in damage and even losses. This has been changed.

"Since we changed to your SPECIAL TRANSPARENT COOLANT, we have not had any rusting or deposits on our machine tools, and this product has eliminated the rusting problem on parts being processed through our plant," says Harlow Adams, president of the company.

The Adams Company found they received important additional benefits as well. Operators could now see their work clearly. There was less wheel loading. Because the coolant didn't foam, more of it stayed on the wheel resulting in cooler operation. Faster cuts were obtained with finer wheels. Finer wheels gave better finishes. Periods between dressings were extended. Tolerances were maintained.

Research, development and more than two years of field testing have gone into Standard's SPECIAL TRANSPARENT COOLANT. This is the pay-out to you on the research done by Standard Oil to bring you better metalworking products. Find out more about Standard's SPECIAL TRANSPARENT COOLANT. Call your nearby Standard Oil lubrication specialist in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about
Special Transparent Coolant

- Clear, transparent fluid.
- Able to control corrosion and rust on work and machines.
- All chemical. Does not support bacteria growth.
- Unaffected by humidity.
- Nonfoaming.
- Fire resistant.
- Odorless.

You expect more from STANDARD *and get it!*

No rust. Shaft ground with Standard's SPECIAL TRANSPARENT COOLANT shows no rust on inspection by A.T. Murphy, General Superintendent, Harlow Adams, President, and Bob Wenger, Standard Oil lubrication specialist.

For more facts circle 535 on Reader Service Card

Type RAD Heater—Used singly or joined to form ovens or heating banks. Standard lengths from 24⅜" to 85¾".

Adjustable Area U-RAD®—Matches heat intensity to work area. Up to 26 different heated lengths, using 6 different size elements.

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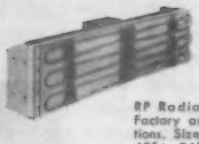

RP Radiant Panels—Factory assembled sections. Sizes from 12" x 48" to 24" x 66". Work temperatures to 700°F.

Production line heating problems? Your CHROMALOX Man has the Answers

Unrelated as they may seem, the products shown above have at least one thing in common . . . each presented an unusual heating problem, and Chromalox Electric Far-Infrared provided the best answer.

To cure a long-lasting, no-chip, no-peel finish, the plastic bodies of Cushman Motor's "Mailsters" receive baked enamel treatment in an oven heated by Chromalox type RAD Heaters.

Vacuum forming of plastics poses other problems handled by Chromalox Far-Infrared. To obtain deep draws in plastic door liners for refrigerators, Admiral Corporation uses a bank of Chromalox U-RAD® Heaters.

Chromalox Far-Infrared has proved to be the best heat source for many other materials, too. For example, when radiant heat lamps proved too "spotty" for curing General Tire & Rubber Co. white sidewalls, the oven was refitted with 150 Chromalox Metaray® Heaters.

Loss due to shelf spoilage of dog food is still another type of problem solved by Chromalox Far-Infrared. The manufacturers of Joy Dog Food use Chromalox Far-Infrared panels installed over the conveyor line to sterilize their product before packaging.

Chances are *you* have a production line heating problem that can best be solved with Chromalox Far-Infrared Heat. You can soon find out. Just call your Chromalox Man listed at the right. He's backed by the world's largest stock of industrial electric heaters, ready for immediate shipment. And he offers factory design-engineering service for special applications.

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2012

YOUR WATER COSTS

Begins on page 156

only need a small softener because of the reduced intake of fresh water.

Wherever you rinse soluble electrolytes from production pieces, a conductivity control is the ideal device to use. It can be set to respond to the desired dilution of the process solution, turning rinse water on and off as required. It does more than this: If production stops, the water is automatically turned off. (Next lunch hour, take a walk through any room where rinses are used and note how many are running full blast.)

You shouldn't jump to the conclusion that re-use of water is always economically the best solution. Consider a single-tank dip rinse that, for process reasons, must be fed with deionized water. The equilibrium concentration in the rinse (and on the work leaving it) is a function of these basic variables: concentration of chemicals, drag-out, water flow. It is also a function of such concentration as will produce satisfactory results. We find it is more economical to deionize the rinse effluent and recycle it.

The basis for deciding whether to deionize raw water for rinsing or to recycle the used rinse water through a deionizer is to choose the method that places the smaller hourly load on the deionizer, in terms of weight per hour of chemicals to be removed from the water. The smaller load will result in lower operating cost, because the cost of chemicals needed to regenerate the unit is a direct function of the load upon it. Also for a given useful life between regenerations the size and hence the initial cost of the unit required are determined by the rate of loading. (See chart, p. 156, Case 1 vs. Case 2.)

More broad approach—The philosophy of the broad approach does not permit your stopping here. If you decide to replace the single tank with a double cascade rinse, not only do you change your mind about recycling and do the same job with less water feed (see chart, Case 3 vs. Case 4), but you find your deionizer need be only about one-eighth as large. This is typical of the unexpected benefits you receive when you are not satisfied with the quick, narrow approach and the pat answer. From an examination

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Corrulux installs easily. **For replacement glazing,** use Corrulux flat panes, pre-cut to fit standard window frames. **For general skylighting and sidelighting** use the corrugated sheets and cut down on expensive framing. Either way, you're money ahead with Corrulux. Please write for the full story. Dept. B-63.

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of the chart you may suspect that if a plant finds it more economical to deionize a rinse effluent and recycle, rather than to deionize the raw feed, then the rinse operation is not as efficient as it might be.

Another pat answer that inevitably gives a wrong result is that to get good rinsing you need only to arrange to "turn the tank over" (i.e., change the whole volume of water) X times in an hour. Nothing could be further from the truth. There are only three variables that are significant in determining the degree of dilution obtained:

. . . *Rate at which contamination is dragged in.*

. . . *Number of rinse steps used.*

. . . *Rate and manner of water feed to the system.*

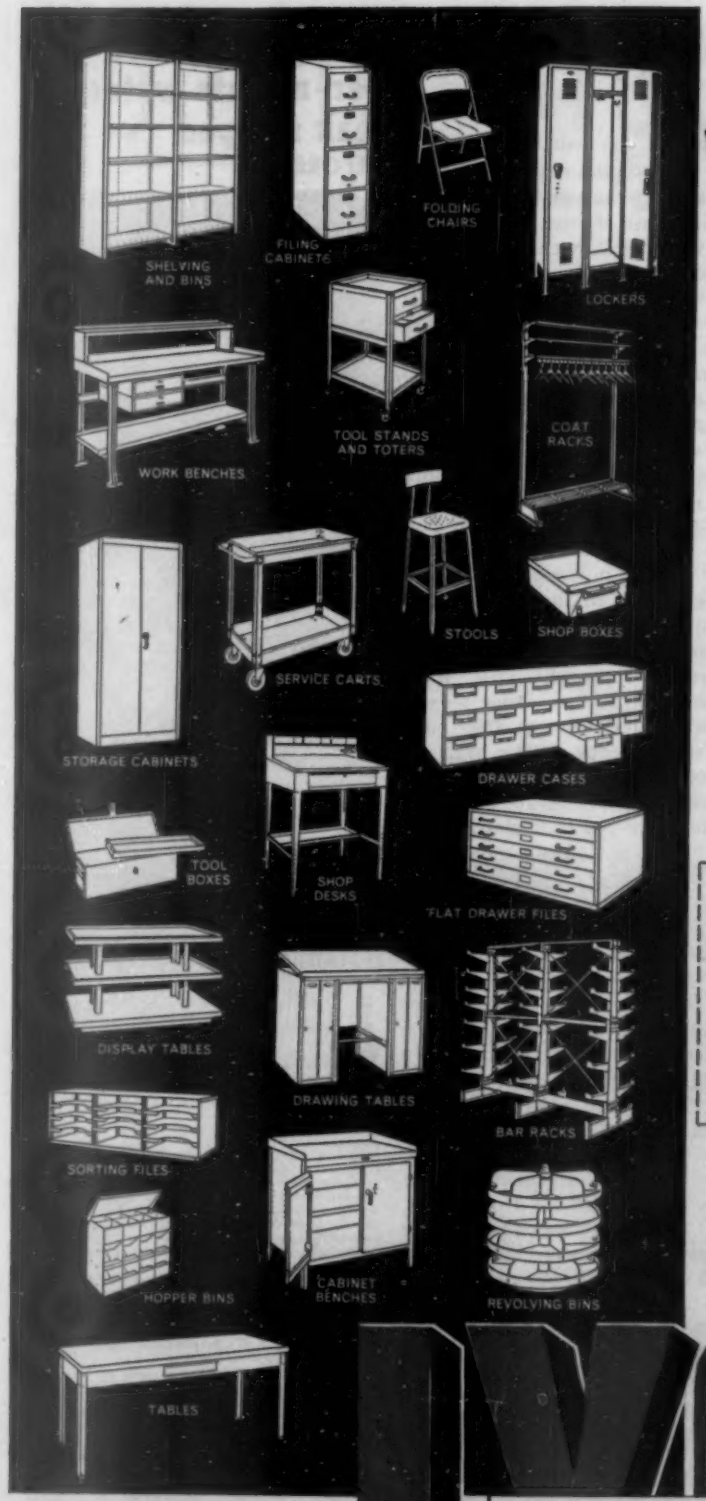
The size of the rinse tank (which for a given flow determines the "turn-over") has no bearing on the matter, provided only it is large enough to contain the work and not so immense that it cannot be properly agitated to obtain good mixing. A rinse must be agitated (usually by air) to insure quick and thorough dilution of the contaminant on the work and to prevent short-circuiting of fresh water feed to overflow.

4. SEWER LOSES MONEY

In the last analysis every item a company purchases, unless bolted to the floor, given away, or sold, eventually is thrown away—often into the sewer.

Some process chemicals, however, are efficiently used. That is, they become a part of the finished salable product, contribute directly to its value, or are a necessary part of the process (but are not consumed in the process or made a part of the product).

Typical of this latter class are practically all the chemicals purchased for a plating and metal-finishing department, exclusive of consumable metal anodes (which do become a part of the product, enhancing its value). The reason you are buying plating chemicals this month is that what you bought last month is in the sewer. What's more, if you have to treat your waste, you will have to buy some more chemi-



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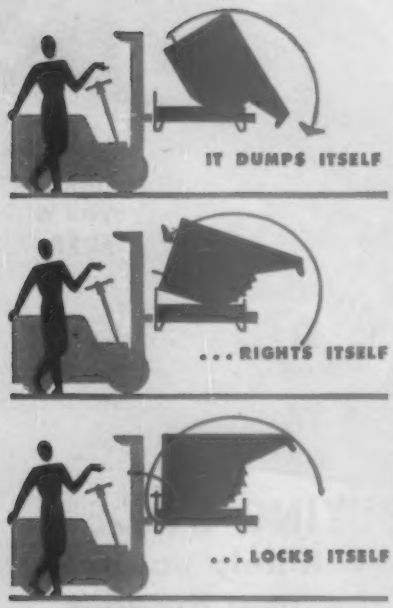
cals before you will be allowed to throw the original ones away.

The only reason the original chemicals are thrown away is that each workpiece that's lifted out of a process tank carries from 0.0004 to 0.008 (or more) gallons per square foot of solution with it, which is rinsed off and flushed down the drain. If you operate a decorative chromium plating operation with no attempt at recovery, you are discarding 80 to 95 pounds out of every 100-lb. drum of chromic acid you buy—and you will pay at least half again its original purchase value to treat it in the waste. Every similar processing bath in a plating room is wholly thrown away, on the average, in three to eight months.

Narrow approach—This is a problem that has no simple narrow answer other than to arrange parts on a rack so they do not drag out solution by the cupful—and to remove them slowly, allowing time for drainage. Another classical approach is to use a reclaim tank, which is a non-running rinse placed after the process tank and before a running rinse. Often, though, this is merely a stopover for chemicals on their way to the sewer.

In theory, when make-up water is required in the process tank, it is taken from the reclaim tank, returning part of the chemicals lost. Unfortunately this procedure relies heavily on the human factor. Furthermore, the effectiveness of the device at best is a function of the evaporation rate in the process tank—i.e., of its temperature. Under average production conditions you will find that a well-operated reclaim tank can save 30 to 60% of the chemicals dragged out of the plating tank, when the latter is operating at 140 F. or higher.

Broad approach—You will apply the multiple cascade principle to the reclaim tank. Feed the water (under level control, if possible) to the first tank of the cascade at a rate just fast enough to replace the evaporation losses in the process tank, and overflow or pump into this tank from the last tank of the cascade. Recoveries of 95 to 98% are possible with this scheme. To



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Cullet . . . Hot Forgings
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BEFORE

AFTER

Waterplug stops running water instantly

Here is what Underwater Services, Valley Station, Ky., had to say about Waterplug

STANDARD DRY WALL PRODUCTS CO.
Box X
New Eagle, Penna.
Gentlemen:
On October 6, 1957, our Underwater Services Company was called upon to repair a major break in an underwater drainage system for the Hardin County Sportsmen's Lake at Elizabethtown, Kentucky. Upon diving to the bottom of the lake we discovered several large ruptures in the 24" tiles used in the drainage system. Water, uncontrolled, was pouring through these breaks at a minimum approximate rate of 20 gallons per minute. Using underwater diving equipment we managed to reduce this torrent by packing sandbags into the holes channeled through the four feet of earth covering these tiles. Descending through a water control tower, we gained access to the interior of the drainage tiles to the area of breakthrough. Above us were four feet of lake bottom and 20 feet of water above that. Under these extremely adverse conditions we used the Thoro System WATERPLUG Cement to repair the breaks from the interior of the tiles.
Because of the simplicity and ease of mixing and applying WATERPLUG Cement, we were able to completely and effectively repair these breaks in the drainage system.
We were delighted with the effectiveness of WATERPLUG Cement in successfully overcoming this difficult water problem. Feel confident that in future underwater repair problems, our company will rely upon WATERPLUG Cement.
Very truly yours,
MICHAEL CALE,
Manager.

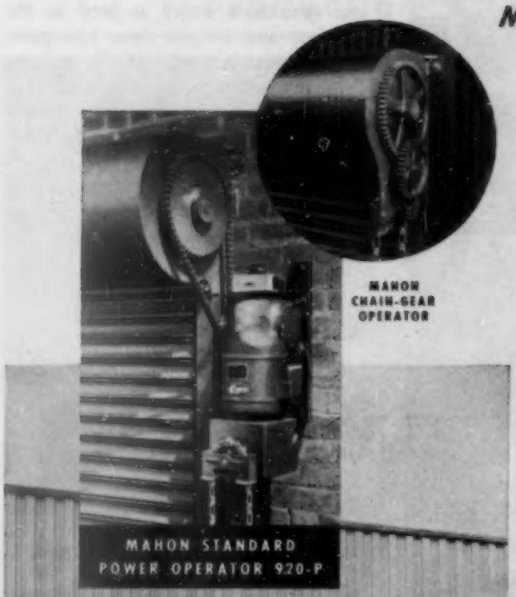
WRITE FOR BROCHURE
"HOW TO DO IT"

STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PA. • CENTERVILLE, IND.

Circle 541 on Reader Service Card

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated



Whether it be for a railroad opening, truck opening, or shipping dock opening, a good rolling steel door offers definite timesaving and space-saving advantages. The fast, vertical roll-up action of the door curtain requires no usable space either inside or outside the opening . . . there are no overhead tracks or other obstructions to restrict headroom and interfere with crane handling. And the all-metal construction of rolling steel doors reduces maintenance to a minimum and provides maximum protection against intrusion and fire. No other type of door can give you all of these desirable features. When you select a rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information including specifications, or write for Mahon Catalogue G-58.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Mahon Power Operated Rolling Steel Doors installed in a railroad opening, a truck opening, and two loading dock openings in a new building for Samuel G. Keywell Co., Inc., Detroit, Michigan. Campbell Engineering Co., Designers. H. F. Campbell Construction Co., General Contractors.

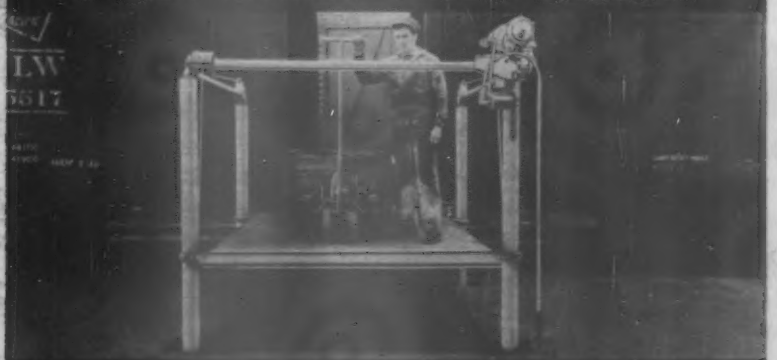
MAHON

ELIMINATE
COSTLY RAMP
CONSTRUCTION
THAT STEALS
VALUABLE SPACE

ELIMINATE THE NEED

SAVE TIME,
MONEY
AND STEP UP
EFFICIENCY

FOR RAMP and DOCK



with a COLSON LEVELER

Throughout industry, the Colson Leveler provides an economical solution to keeping materials on the move without complex footings, sub-surface installations and costly dock arrangements. Equipped with casters it becomes completely portable.

When serving two floor levels, it eliminates space-wasting ramps that drain electric truck batteries and create laborious bottlenecks for hand-pushed carriers. It's an effective, weatherproof adjustable dock designed for loading and unloading safely, gently and efficiently . . .

For loads from 2,000 to 20,000 pounds . . . for both stationary and portable applications use Colson Levelers to save time, labor and money. Send for special catalog InW-21.

THE COLSON CORPORATION
Special Products Division
Somerville, Mass.

The Colson Corporation
A Subsidiary of Great American Industries, Inc.—Elyria, Ohio

Plants in: Jonesboro, Ark., Elyria, Ohio, Somerville, Mass., and Toronto, Canada

avoid build-up of hard-water chemicals in the process tank, you can use deionized water as feed to the cascade and to any rinse just prior to the process tank. If the process tank temperature is too low to provide much evaporation, a small evaporator can concentrate the solution from the last cascade up to or above process concentration. The distillate and steam condensate from the evaporator may advantageously feed the cascade.

5. STREAM POLLUTION

Narrow approach—If the authorities have cracked down on you with an order to cease the discharge of a polluted effluent from your plant, the narrow response is to get some expert to design and build a plant to treat your waste.

Broad approach—It may now be defined more specifically. You say you have a waste treatment problem. But we previously made the statement that the broad approach does not recognize such a restricted classification. A waste problem, and almost any process-water problem, is so much a part of plant processes that it cannot be properly considered apart from them.

Only a broad approach that observes the whole scene can give wholly adequate answers. It is a mistake to believe that an efficient waste treatment plant can be built without an intimate knowledge of the processes producing the waste. To obtain the most favorable conditions in the waste, it is essential that you make some adjustments to the plant processes themselves.

The actual processes of waste treatment need not concern you here. The purpose of the broad approach in this instance is to reduce the size, complexity, and severity of the waste nuisance so that the treatment plant may be as small and simple as possible. This is done by applying all the means at your command to reduce your water consumption, because waste volume determines the size of the treatment plant. At the same time you should make a vigorous effort to conserve chemicals, because the chemical operating cost of treatment is a direct

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first in silicones

Dow Corning

SILICONE NEWS

production and maintenance edition • No. 25

OUTDOOR CABLE NEEDN'T FAIL

Protect your outdoor electrical circuits against rain and other weathering hazards. Reduce electrical failures and maintenance costs. How? Here's a way. Electrical Products Corp., a leading outdoor sign producer on the West Coast, had a big maintenance problem after every heavy rain. Too many electrical failures caused by wet wiring.

In searching for a wire and cable insulation that would stay dry in downpours, they discovered Silastic®, the Dow Corning silicone rubber. Silastic sleeves were slipped over the high tension leads to the ZEON tubing. Then the big test: a heavy rain in San Francisco.

In the San Francisco area after the storm, moisture had caused 200 signs NOT protected with Silastic to fail. But none of the 500 signs equipped with Silastic covered leads showed any sign of trouble! This experience has been borne out in other installations since. The sign producer reports failures down to almost zero and maintenance substantially reduced, thanks to Silastic.

Silastic not only keeps moisture out, but prevents flashover, arcing . . . resists corona, ozone and weather aging. Where heat is a problem, Silastic withstands temperatures as high as 500 F without losing its dielectric properties or resiliency. Conversely, it is unharmed by sub-zero cold. In short, you can say goodbye to shorts caused by weather when you protect outside wire and cable with Silastic. ***No. 258***

THIS MOTOR WON'T QUIT

Here's a tip on avoiding motor maintenance and failures. It comes from the Cadillac Gage Company of Detroit, Mich.

Cadillac really had a problem. The machine you see in the picture is a three-speed reversing thread grinder. Its drive source was originally a 2-hp, three-speed Class A motor. But the motor couldn't take the strain of reversing as many as 120 times a minute at 3600 rpm. Such heat was generated, the motor failed.

So Cadillac replaced it with a 3-hp motor. Once again, even with the 50% increase in rating, the motor couldn't take the loads, and failed.

This sort of interruption, naturally, costs a lot in downtime . . . not to mention the motor cost. But Cadillac found an answer. They sent the second motor to Standard Electric Motor Works in Detroit and had it rewound completely with Dow Corning silicone insulation.

As a result of rewinding with silicones, the motor at this plant is now running fine. It hasn't failed since installation, and that was three years ago!

Having trouble with motors failing under load? You, too, stand to profit by rewinding with silicone insulation. Odds are you'll pick a rewinder well known in your area, from our list of motor repair shops. ***No. 259***

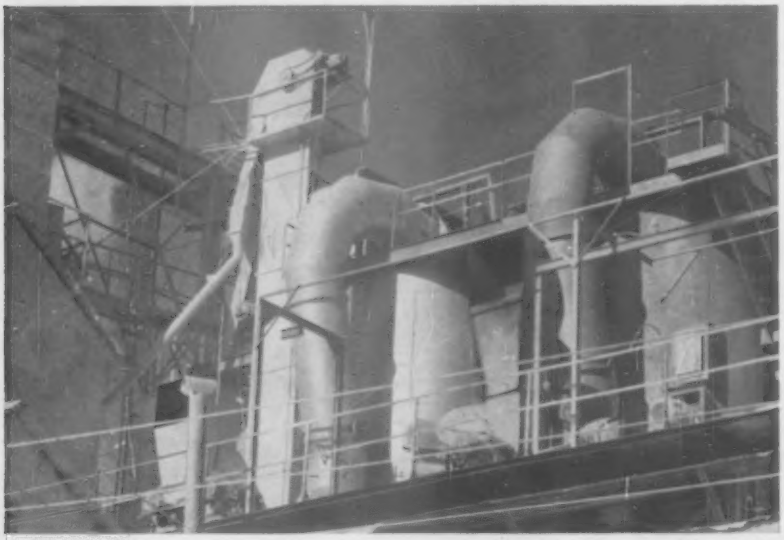
HOT RELEASE

In selecting a mold release agent, you usually take temperature into account. But sometimes temperatures are even greater than expected. Then troubles begin. That's why it's best to start right out with the most heat-stable release agent available.

Typesetting machines in the printing industry are a good example. *(Cont. Pg. 2)*

FOR DATA RELATING TO THESE ARTICLES, CIRCLE REFERENCE NUMBER IN COUPON ON NEXT PAGE

MORE



RED HOT PAINT IDEA

Process equipment that runs hot can often ruin an ordinary paint. And when the paint fails, you have a choice of repaint or rust. Both are costly. Here's how a new kind of paint alleviates the condition.

For years the Austin White Lime Company of Austin, Texas faced a hot spot problem. Their kilns and exhaust stacks had to be cleaned and refinished annually. Subjected to surface temperatures of 650 to 750 F, 24 hours a day, 7 days a week, the graphite paint they used never lasted a full year. It was always badly deteriorated and in need of repainting when clean-up time came.

In 1952, Austin tried something new. When annual clean-up rolled around, they sandblasted the kilns and stacks and coated them with Thermalite — an aluminum paint, produced by the Tropical Paint Company of Cleveland.

Based on Dow Corning Silicones, the Thermalite finish has been constantly subjected to 650 F and higher, without damage. Occasionally, the kilns and stacks turn literally red hot, due to unavoidable combustion in the plant processes, but the Thermalite has held up in excellent condition. Austin regards this finish as "by far the most satisfactory paint we have ever used." *No. 260*

RELEASE AGENT *(Continued)*

Lines of type are cast by forcing molten lead into slot-like molds. If any lead is sticking to the outside of the slots when a line is cast, the "lock-up" won't be tight and lead can squirt out. Obviously, production time then becomes cleaning time. What's needed is a release agent that withstands the 500-degree heat involved. Just such a material is Slic, made with Dow Corning Silicones by Star Parts, Inc., South Hackensack, New Jersey.

Applied to the felt blades and the slot area, this heat-stable silicone release prevents lead from clinging and building up where it's not wanted. It lets the lead flick free when felt blades wipe the slot area after each casting cycle. Hours of cleaning time formerly needed when graphite was used for release are eliminated.

That's typical of the kind of results you get when using Dow Corning silicone release agents in fabricating rubber, plastics, metal or glass. *No. 261*

new literature and technical data on silicones

Encapsulating with Silastic is an instruction sheet that details the steps to follow in encapsulating fine instruments and delicate equipment for maximum protection. Silastic provides a resilient jacket that protects such units against shock, moisture, corrosive atmospheres and weathering. *No. 262*

A silicone surface that's easily applied at the bottling plant costs next to nothing per unit, adds slip to the glass, increases line efficiency and handling ease, and reduces damage in shipping. *No. 263*

Silicone Insulated Motors Last Longer — Cost Less. A new brochure bears out this fact with numerous case histories of motors operated for years under adverse conditions in many different industries. An illustrated booklet, it's sure to suggest ways in which you can use silicone insulation to obtain low-cost protection against the effects of overloads, high ambient temperatures, rapid reversing and moisture. *No. 264*

Dow Corning silicone lubricants reduce maintenance costs of many production operations, cut bearing failures to a minimum, and eliminate downtime. Typical applications include motor bearings, conveyor systems, instruments, mixers, and similar equipment that must operate over wide temperature spans. Details on properties and applications are included in an 8-page brochure. *No. 265*

Sources of paper and paperboard with a Syl-off silicone release coating are listed in a source of supply sheet recently published by Dow Corning. Included are producers of kraft, glassine, parchment, bags, containers and cores. *No. 266*

Silicone-glass laminates for mechanical and electrical applications are available from fabricators listed in a brochure that cites typical applications and properties. The stability and serviceability of such laminates make them particularly useful components in various production and maintenance units. *No. 267*

Dow Corning Corporation, Dept. 5110a, Midland, Michigan
Please send me: 258 259 260 261 262 263 264 265 266 267

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SILICONE NEWS is published for production and maintenance men by

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

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THE NEWEST CONCEPT IN WIRE ROPE

*Herringbone**

two ropes in one!

Here is a combination that has proved itself during three years of field testing. A welcome addition to Roebling's great line of wire ropes, Royal Blue *Herringbone* is both a regular lay and lang lay wire rope!

So, in one rope you have the greater flexibility and abrasion resistance of lang lay construction *plus* regular lay's superior stability under severe operating conditions.

Preformed Herringbone is made of two *pairs* of lang lay strands, and two strands of regular lay which separate the two pairs of lang lay—all of it made of Type 1105 rope wire.

For three years Herringbone has been used for general hoisting, holding and closing lines, shovel ropes, wagon scraper ropes and dragline ropes. Without reservation, its performance has been superior to that of any other rope used for the same jobs . . . even in the hands of inexperienced personnel! *Its proven capabilities clearly suggest its use for all jobs where steel core ropes are normally used.*

See your Roebling salesman for all the facts or write Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey. Roebling Herringbone, the two-in-one rope to meet the *doubly* stringent demands of today's economy.

*Reg. app. for

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HERRINGBONE
WIRE ROPE

Cincinnati CLEANING AND FINISHING SYSTEM

installed by

BRUNING

produces

- Savings in Material Handling
- Improved Product Quality
- Better Working Conditions

Cincinnati Cleaning & Finishing Machinery is used in the production of a wide range of Bruning equipment for drafting and copying, earning the user's commendation for savings, improved product and working conditions.

The monorail cleaning machine shown here processes frame parts and cabinets of copying machines prior to finishing; it is also used to clean machined parts between operations. The cleaning machine is part of a complete Cincinnati system which also includes: dry-off oven, down-draft spray booth, paint bake oven, monorail conveyor and air make-up unit.

Use the engineering and experimental facilities of Cincinnati Cleaning to get more economical cleaning and finishing . . . with better results . . . in your plant. For details, write: Cincinnati Cleaning & Finishing Machinery Co., 2021 Hageman St., Cincinnati 41, Ohio.

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function of the amount of chemicals that are going to waste.

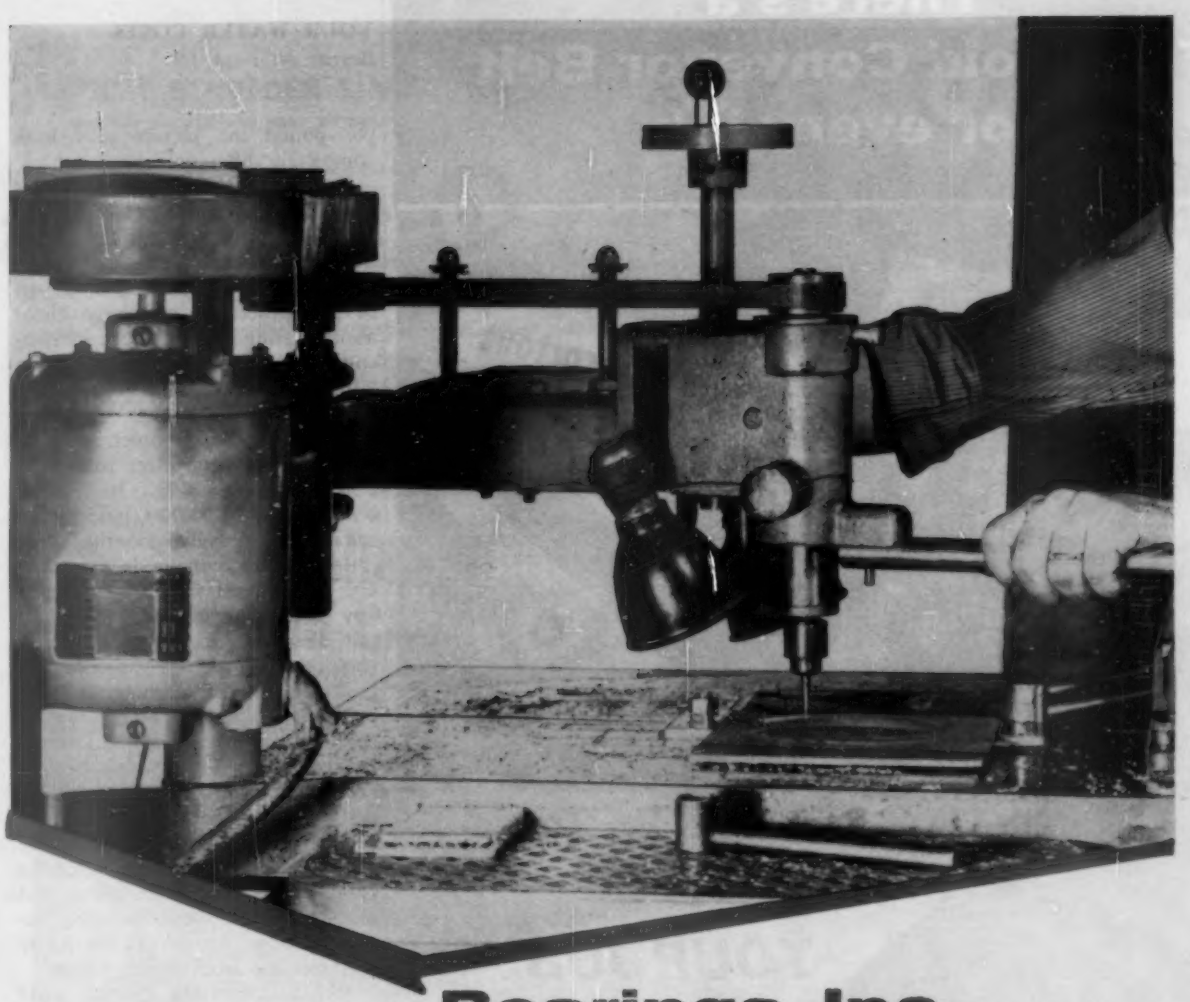
The ultimate in conservation of a chemical is not to use it at all. In one plant an oxidation reaction could be made to go equally well with a chromate or peroxide oxidizing agent, but the first was chosen originally for reasons of cost. The undesirable chromium in the waste was entirely eliminated by changing to the peroxide agent, with an overall saving when waste treatment costs were tallied.

A particularly costly offender in this respect is the group of cyanide chemicals, extensively used in heat-treating and electroplating. Cyanide heat-treating has been avoided by using other methods—with more expensive equipment, to be sure. But cyanides in the waste also require expensive equipment, and the chemicals needed for their destruction are very costly.

Sometimes, but not always, it is possible to avoid the use of cyanides in electroplating. To take an instance, one large manufacturer of automobile bumpers uses one plating sequence—nickel strike, acid copper plate, buff, nickel plate, and chromium plate (note, no cyanides)—instead of the more conventional cycle: cyanide copper strike, acid copper plate, buff, nickel plate, and chromium plate.

This way, without using cyanide heat-treating, the troublesome cyanides are completely eliminated from this plant's wastes. The extensive facilities needed for cyanide treatment aren't necessary. And an estimated cost of $80,000 to $100,000 per year for treatment chemicals is avoided.

Complete elimination of waste treatment, however, is not often possible. In most cases, therefore, you must seek means for more or less complete chemical recovery. In evaluating the economies of any recovery, don't fail to include the capital and operating expenses of waste treatment. In the narrow view it may not look attractive to install a recovery system to save sodium cyanide at 19¢ per pound. But in waste treatment another 65 to 75¢ will be spent to destroy that pound of cyanide, and at 85 to 95¢



Bearings, Inc.

repaired, serviced and returned this high speed spindle in just 48 hours!

—And we can give *you* this kind of service when you need it! This is a spindle on a router operating at 10,000 R.P.M. Its super-precision bearings were failing and the spindle would no longer perform satisfactorily.

Our customer is located in Mansfield, Ohio, and at 10 a.m. on a Sunday the spindle was placed on a bus headed for Cleveland. The Bearings, Inc. Spindle Repair Department in Cleveland met the bus and work began immediately to bring this spindle back to its original accuracy and operating efficiency. The customer received the completely overhauled spindle the following Tuesday. Repair and transportation time — less than 48 hours!

Bearings, Inc. complete Spindle Repair Department is another service we offer our customers and all high speed grinding and precision spindles repaired by us will be returned to you, not in weeks *but in hours*— A service time you won't find equalled anywhere! Write or call our branch nearest YOU.

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OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
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There's a Thermoid Conveyor Belt for every job

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You'll find that Thermoid has a Conveyor Belt that wears better, lasts longer, stays "on the job" to save you time and money. Each Thermoid Belt is built to do a specific job *best.* The same is true of Thermoid Hose, Multi-V Belts and Friction Materials. Call your local Thermoid Distributor.

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Begins on page 156

per pound the picture may look completely different.

Various methods for recovery of chemicals are available. We have cited the cascade reclaim tank, which can effect startling recoveries in rinsing operations. By a variant of this procedure one large chromium-plating plant reduced its consumption of chromic acid from 270,000 to around 30,000 pounds per year. The percentage of chromic acid sold to the customer as chromium plate on the piece rose from 5% to almost 90%. Installation cost less than $10,000, paid for itself in less than two months.

Ion-exchange methods of recovery are at least possible in almost any case where ionized compounds are dissolved in the waste. You should examine the economies of their use for each application. This method is wholly practical for regenerating chromic acid anodizing baths that otherwise would be discarded. It has found (as yet) limited application to recovery of nickel and copper from plating rinses. But ion exchange, or a combination of ion exchange and evaporation, has been favorably accepted as a means of recovering chromic acid from plating rinses.

We described the cascade rinse as the answer to a rinse-water deficiency problem, which answer was obtained by the broad method of approach. Why broad? Because the approach considered every classification of water problems—supply, effectiveness, cost, disposal—before coming up with an answer. It happened that benefits were derived in all four. The problem of an ineffective rinse was indirectly solved by searching for these other benefits—better rinsing with less water, meaning lower water bills and the assurance of a continuously adequate supply; a smaller waste disposal plant with correspondingly lower capital outlay, labor and power costs, less space requirements. Adding a conductivity control assured the continuance of these benefits and prevented wasting water when production stopped.

There is yet another benefit derived from use of the controls in the area of waste treatment: The

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. . another reason why your air system installations will perform best.

A—Mounting holes always conveniently located.

B—"O" rings used for surest airtight seal.

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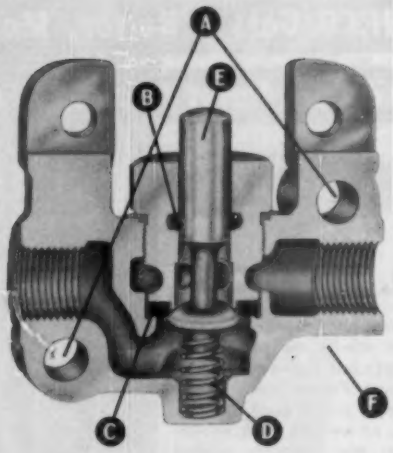
F—All parts designed for greatest air flow, longest life and simplicity of replacement and interchangeability.



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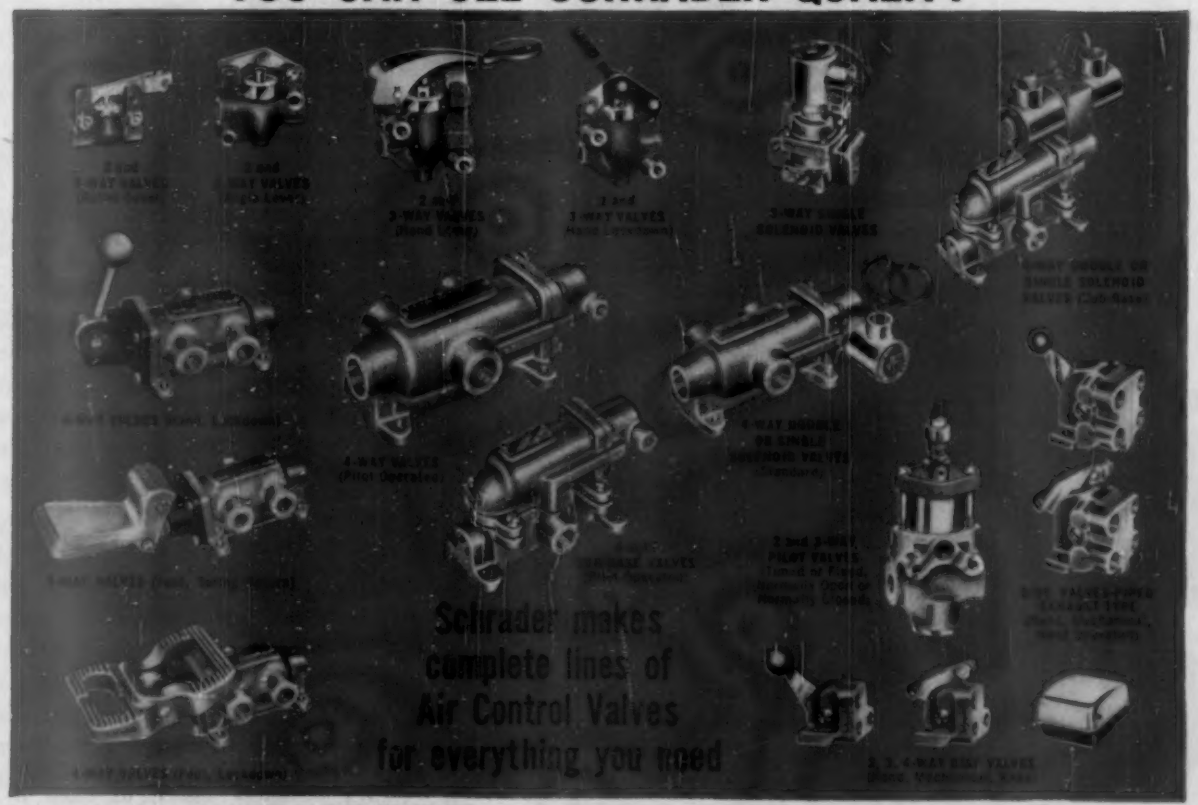

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QUALITY AIR CONTROL PRODUCTS

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TURCO Gets a Better, More Uniform Finish

And Cuts Paint Cost 35% with—

RANSBURG

NO. 2 PROCESS

Frequent color changes are simplified now in the painting of playground equipment with Ransburg Electro-Spray in this St. Louis plant. Long, tubular parts, as well as these smaller pieces, are uniformly coated with the Ransburg reciprocating disk.

QUALITY IMPROVEMENT! That was Turco Manufacturing's chief reason for changing from flo-coat to electrostatic spray painting of their quality line of playground equipment.

Not only is Ransburg No. 2 Process providing a higher quality, uniform coating on all parts, but Turco is saving 35% in paint cost!

Simplicity in color change with Electro-Spray is another important advantage here. With Turco's production methods, colors are changed 15 times in an 8-hour shift. Now, changes are made on the fly with no down-time. By contrast, the former "stop and go" method would mean over an hour's lost time in a day's operation.

NO REASON WHY YOU CAN'T DO IT TOO!

Whatever your product, if it's painted, we'd like to tell you more about the worthwhile savings and benefits which can be yours with RANSBURG ELECTROSTATIC PAINTING PROCESSES. Write for our No. 2 Process brochure which cites many examples of electrostatic spray painting on a wide variety of products.

Call or write

RANSBURG
Electro-Coating Corp.
P.O. Box 7822, Indianapolis 23, Ind.

concentration of rinse effluent going to waste is maintained fairly constant. In an automatic waste-treatment plant there is no longer a need for large retention tanks to minimize fluctuations. Feeder equipment need not be oversized so much to take care of sudden surges, and the controls themselves will work more surely and smoothly.

The point needs no further discussion. We have called it the broad approach simply because in thinking about a specific problem we have integrated the factors affecting the problem directly with all other factors of plant economy.

6. WATER FOR NEW PLANT

Many industries are finding it attractive these days, for a variety of reasons, to move out of congested, high-cost urban locations into more rural areas. What about the water supply?

Narrow approach—Survey the location for expected gross requirements of the company's water needs. It's probable that in this approach you would give little or no thought to the possibility of reuse of water should the available supply be lower. And thus you might pass by an otherwise ideal location. It's also probable you would make no study of disposal facilities that are so limited as to rule out the location.

Broad approach—When a new plant is in the design stage, no matter what its location, the opportunity for applying the broad approach to process water handling is at its best. But because the location affects the water situation, this additional factor should be integrated into the planning.

Sometimes the water situation will govern the location of the plant. Most companies will investigate the water supply before buying land. It's obviously insane to build a brewery in the middle of Death Valley. But possible disposal problems are not always so thoroughly explored. Take two examples:

. . . One company, following this modern flight to rural locations, built a larger plant and was engaged in a gradual process of transferring

Motorola 2-way radio users

INCREASE THE PRODUCTIVITY

of industrial vehicles

34%*

*** Operating records of 45 typical companies prove that 2-way radio increases productive operating hours per day of each vehicle from 5.3 to7.1 —a gain of nearly 2 HOURS A DAY!**

One of the men surveyed put it this way: "Without radio, we would require many more vehicles and men to carry on our present operations."

In plants of all sizes, Motorola 2-way radio enables drivers and machines to increase their productivity. Radio links materials handling vehicles both inside and outside the plant with one central dispatcher . . . helping move *more* materials *faster*, and getting them where they're needed *on time*.

No matter what vehicles your business uses—a fork lift truck, a supervisory car, or a 10 ton truck— you, too, can profit from Motorola 2-way radio. It's simple to obtain your Motorola mobile radio system; all details are handled for you. Motorola's complete 2-way radio "package"—systems engineering, financing, installation and maintenance—assures you of the finest communications system, designed to fit your needs. Get the proof—write today for your Motorola case history portfolio.

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., A Subsidiary of Motorola Inc., 4501 Augusta Blvd., Chicago 51, Illinois

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YES, BILL. THAT'S WHY I BRING MY KEY MEN ALONG. THEY GET A NEW PERSPECTIVE ON THE INDUSTRY, AND THE FUTURE. THEY GO BACK TO THEIR JOBS RECHARGED WITH IDEAS. THEY'RE WORTH MORE TO OUR COMPANY, AND I AM TOO.

You, too, will find new ways of cutting costs at the

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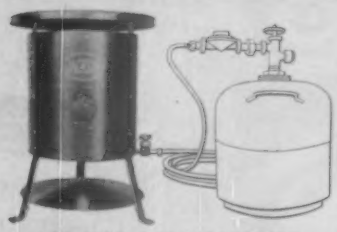

L/P GAS SALAMANDERS

Two improved models combine efficiency and economy. Inside baffle produces even flow of heat. Dual purpose shield spreads heat, eliminates hot spot under unit. Holes in feet permit fastening. Equipped with U/L approved low-pressure regulator, hose assembly and fittings. Automatic safety shut-off controls available and recommended for unattended operations.

MODEL 500—50,000 BTU per hour
MODEL 750—75,000 BTU per hour
MODIFIED MODEL 500, equipped with automatic safety shut-off control and a 12-ft. hose with standard fittings is approved by Board of Standards and Appeals for use in New York City.

COKE SALAMANDERS

Used for outdoor warming centers for workmen or burning trash and rubbish. Equipped with cast iron grate and three poker holes just above the grate line. Has two steel hooks to move unit from place to place. Three steel legs elevate salamander 8¼". Three models available.

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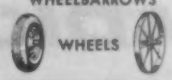

WHEELS

MORTAR PANS

Jackson

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departments, in a piecemeal way, to the new location. When the time came to move the plating department, company officials belatedly looked into the disposal problem and were warned by the authorities that there was danger of their being ordered to terminate activities should the health board at any later time find fault with the waste treatment. Their new plant location was on the watershed of the supply reservoir for a large city. They regretfully left the plating department at the old location.

. . . *Another company had a problem relating to the volume of waste water that could be accepted in the municipal sewage disposal plant.* More than 1 mgd. (million gallons per day) would dilute the sewage to the point where biological activity in the municipal disposal plant would be adversely affected. The company was getting along all right until, during World War II, a plating process was installed that upped the water requirements to an estimated 6.5 mgd. This was before some of the concepts we have been discussing had been fully developed and before tools such as the conductivity control were available. Nevertheless, by re-using some of the water, this company did reduce the requirements to 3.5 mgd., of which 2.5 mgd. was deionized and recycled, the balance of 1 mgd. going to the sewer. As we have seen, if the company had been able to use fully the concepts we have been discussing, it could have made a much greater water reduction, possibly to the extent of eliminating the need for deionizers.

You'll get more help...

. . . on your water problems in the following articles from your previous issues of FACTORY. Reprints are not available.

"How You Can Get Better Water," November 1955.

"Why Water Spells Trouble," October 1955.

"Plenty of Clean Water Now," February 1956.

"New Proof: It Pays to Save Water," July 1957.

"We put Cities Service through the mill!"

In Eastern's Sendzimir mill, Cities Service Pacemaker Oil plays dual role—general lubricant and rolling oil

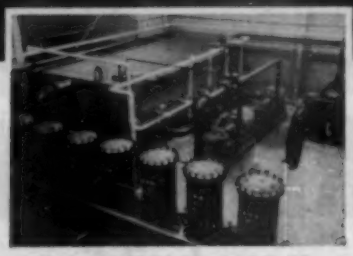
Long a major producer of flat rolled stainless steels, Eastern Stainless Steel recently took another step forward with the installation of a Sendzimir rolling mill.

With this unusual mill, Eastern can roll 700 feet of steel per minute, up to 49 inches wide. What's more, a roll of steel can be reduced from ¼" thickness to .003" thickness!

Needless to say, the pressure and heat generated by this unusual machine create a formidable lubrication job—but it's all taken in stride by Cities Service Pacemaker "O" Oil. Eastern found this one lubricant can play a *dual role* . . . is ideal as a rolling oil and also for bearings and general lubrication.

Pacemaker "O" qualifies for this double role for these reasons: Fully fortified against oxidation, rust, and foaming it combines friction reducing properties with high rate of flow . . . is pumped at the rate of 1000 gallons per minute. "Thanks to this versatility and combination of desirable properties, we've found the oil highly satisfactory and helpful in overcoming some of our problems," says Eastern. "It is a fine lubricant."

If you're looking for lubrication that's more than merely adequate—the kind of lubrication that pays its own way in reduced downtime—get a free lubrication survey from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

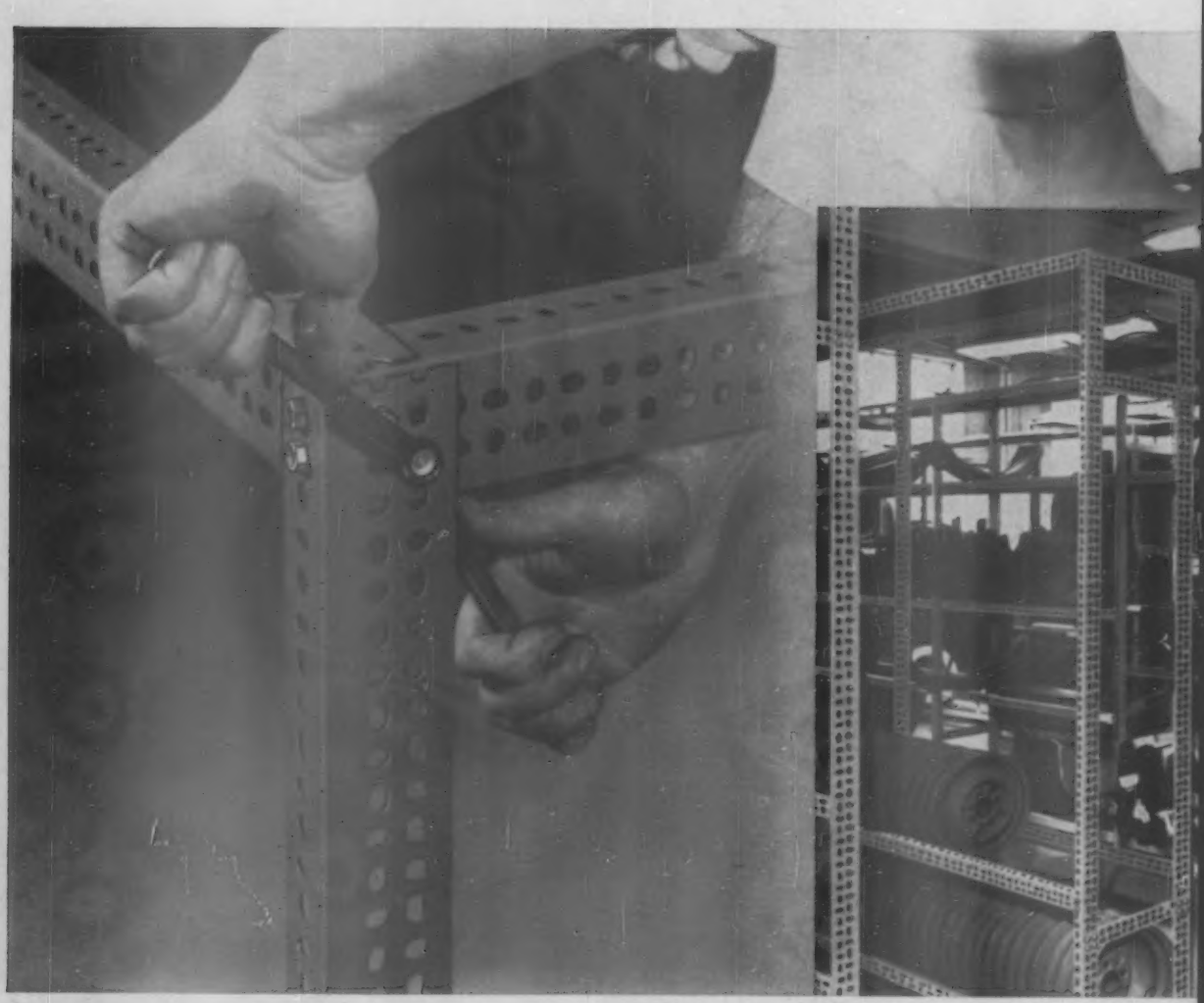


11 Oil Filters help assure purity of Cities Service Pacemaker Oil. Oil's excellent anti-rust, anti-foam properties plus rapid rate of flow make it ideal for rolls and general lubrication.

3750 H.P. Electric Motors develop the tremendous power required to drive Eastern's Sendzimir mill. Mill uses 35,000 gallons of Cities Service Pacemaker Oil, cooled by water drawn from pond outside.

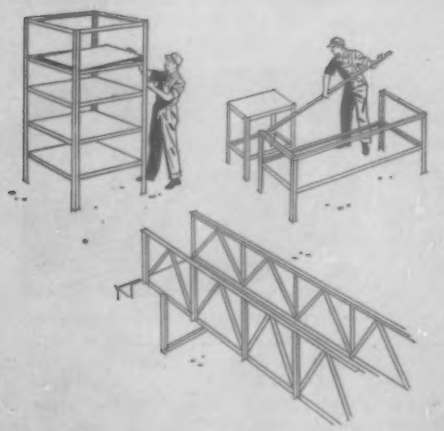
CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



REPUBLIC METAL LUMBER

...new building material meets every framing need



Now . . . new building material made of steel with all the framing erection conveniences of common lumber. Republic's new slotted-angle METAL LUMBER is unlimited in application.

Secret is the precision-engineered system of short slots placed to allow ¼" vertical and horizontal adjustment for utmost flexibility in meeting design requirements. Two-way short-slot pattern provides sufficient bolts in bearing to assure adequate joint strength. Easy to use—simply measure, cut, assemble.

Republic METAL LUMBER® is Bonderized, finished with baked enamel after fabrication for greater resistance to rust and damage. Delivered in easy-to-handle bundles of 10 angles, .080 gage or .104 gage, 10- or 12-foot lengths, hardware included. Stores in same space as one 2" x 4" piece of lumber.

Save time, space, and money in building storage racks, catwalks, supports, guard rails, special purpose tables, facilities. Call your Republic representative or write for idea-packed catalog.

For more facts circle Reader Service Card numbers as follows:

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FACTORY
MANAGEMENT AND MAINTENANCE

LABOR RELATIONS NEWS

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc., Member, New York Bar

Internationals Are Separate Bodies

The law says your local union and its international are separate entities. And the international usually isn't responsible for the actions of the local.

International unions can play legal hop-scotch. They can influence your negotiations, then jump behind the separate legal entity theory when the going gets tough. Here's the story:

Suppose your company enters into a contract for the construction of a shed. At the start of the contract, you'll read something like this:

"This Agreement entered into on such and such date by and between John Jones, Inc. (the Owner), and Richard Roe, Inc. (the Builder)." When you have read this, you'll have a pretty good idea as to whom you are doing business with, who is responsible when something goes wrong in the construction of the shed.

But now let's take the average union contract. When you negotiate this piece of business you talk to representatives of both the local and the international and more likely than not you can't easily discern a difference in point of view. But when it comes to the opening phrase of the contract, the international often will insist on this kind of language:

"This agreement entered into on such and such a date by and between John Jones, Inc. (the Company), and Local 301 of the International Association of Hoodwinkers (AFL-CIO) (the union)."

Your labor lawyer or labor relations manager won't get anywhere if he asks for something like this:

"This agreement by and between John Jones, Inc. (the Company), and Local 301 of the International Association of Hoodwinkers and the International Association of Hoodwinkers (AFL-CIO), jointly referred to herein as the Union."

Although the business agent who is on the International's payroll will most likely sign the document as business agent, he'll squirm mightily at any reference that would make the International a party to the agreement. This reticence stems from a long line of Supreme Court and NLRB decisions which hold that a local union is a legal entity apart from its international and is not a mere branch or arm of the latter. Local and international are separate entities unless the union's constitution and bylaws negate the separate entity idea. The business agent is ordered to preserve this relationship. It's a case of legally eating your pie and having it, too.

A recent NLRB decision gives a good example of the separate entity theory. This was a case of secondary boycott by a local. The Board relieved the international of responsibility. In the Board's words:

"An international union's constitution regulates and controls the operations of its constituent locals. But that regulation is rarely so complete as to make the local merely a branch of the international. In the main, these provisions delineate the jurisdiction of the confederation and the affiliated units with reference to collective bargaining, membership and discipline, assessments for the common cause, participation of the local units in the affairs of the association and the regulation of the locals."

These provisions lay restraints upon the activities of the local union, but they do not deny its separate existence and make of it a mere "administrative arm" of the national. Then the Board said: "The overwhelming weight of judicial authority, including the Supreme Court of the United States is that a local union is a legal entity, apart from its international." That, too, has been the position of the Board.

Overwhelming as it may have been to the Board majority, it was not so to Board Member Jenkins. In his dissent, he argued that the local "was an administrative arm of the international through which the international acts." Moreover, Jenkins found that the international adopted and ratified the acts of the local. On that point, the Board majority had ruled that the local or the representatives of the international had to have actual authority in black and white to act for it. This was lacking.

The net result of all this is that the international has legal leeway to speak its piece, make its mark on management-union matters and then jump behind the protective separate entity theory. For the complete rundown you may want to read the decision: "International Brotherhood of Electrical Workers, et al, and Sherman T. Rock" (published in Volume 42 of the Bureau of National Affairs LRRM Service).

Don't Fool With Seniority

You can punish employees by discharge; reprimands, written and oral; layoffs or docking. But don't touch their seniority. This is sacred territory, according to Arbitrator Peter M. Keliher.

Wildcatters at the Lane Star Steel Company prevented employees from getting into the plant. The company laid the law down: Unless they returned to work by such and such date they would be suspended for five days subject to discharge. As for the leaders of the wildcatters—they'd be suspended irrespective of

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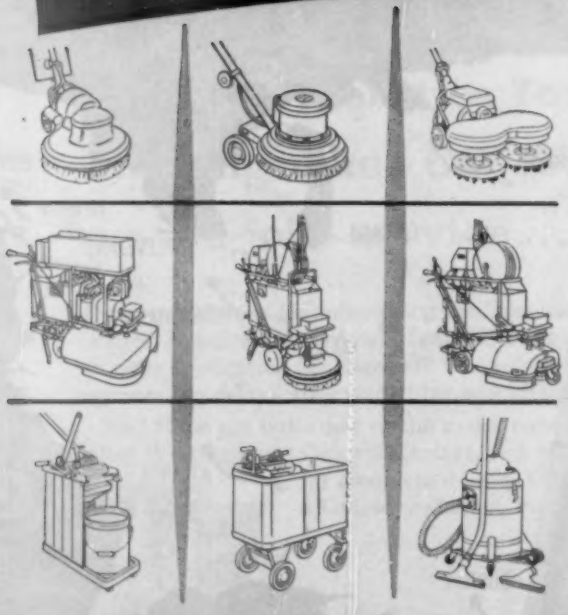

However much a maintenance man may want to do a good job, and at the same time show savings in labor costs, he's *stymied* if the machine is too small, or too large, or is otherwise unsuited to the job. Different floors and areas call for different care and equipment. That's why *Finnell makes more than a score of floor-maintenance machines.* From this complete line, it is possible to choose equipment that is correct in size as well as model . . . that provides the maximum brush coverage consistent with the area and arrangement of the floors.

Finnell offers *Conventional Polishing-Scrubbing Machines* in both concentrated and divided-weight types, each in a full range of sizes . . . a *Dry-Scrubber,* with self-sharpening brushes, for cleaning grease-caked floors . . . *Combination Scrubber-Vac Machines* for small, vast, and intermediate operations, including self-powered as well as electric models . . . *Mop Trucks* . . . a *Wet and Dry Vacuum Cleaner,* in baked enamel or stainless steel, with 1½ hp By-Pass Motor. In addition, *Finnell* offers a full line of fast-acting *Cleansers* for machine-scrubbing . . . *Sealers* and *Waxes* of every requisite type . . *Steel-Wool Pads* and other accessories — *everything for floor care!*

In keeping with the *Finnell* policy of rendering an individualized service, *Finnell maintains a nation-wide staff of floor specialists and engineers. There's a Finnell man near you* to help solve your particular floor-maintenance problems . . . to train your operators in the proper use of *Finnell Job-Fitted Equipment and Supplies* . . . and to make periodic check-ups. For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2510 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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BRANCHES IN ALL PRINCIPAL CITIES

their willingness to return to work. About 2500 workers refused to come back. They were promptly told they could do so later only as new employees with a loss of seniority.

Arbitrator Keliher said: "Loss of seniority is not an accepted form of disciplinary penalty in industry." It's a sort of vested right that affects the standing of employees in the plant. Reinstate the strikers without loss of seniority, he ordered, but without back pay. No reinstatement for the instigators and wildcat leaders.

Keliher also pointed out that the contract provided for suspension and discharge as the only penalties for this offense.

No Pension Termination

A pension plan in which the company made all the contributions was the central feature of this case involving McKesson and Robbins, manufacturers and distributors of drugs and other products.

The trouble started when this company shut down one of its divisions and let all 88 employees go. If the plan were to be considered as terminated because the division was shut down, these 88 would share in the pension fund under the rules of the plan. But if this were not so, then their only right on termination under the plan would be a contingent right to receive a pension at age 65.

A U.S. court of appeals found that the plan was not terminated or even partially terminated. It determined that McKesson and Robbins was very much in business and had previously given up divisions and opened new ones, and would probably continue to do so. Moreover, the 88 employees constituted only 1.6% of the total McKesson and Robbins employee force. No termination of plan and no sharing in fund, ordered the court.

The court quickly discounted the employees' emotional appeal that they had relied on a pension or a share in the fund and were deprived of both. While agreeing with them that it was a court of equity prepared to do justice, it saw no reason why the terms of the pension plan should be twisted.

Poor Election Tactics

One of the big barriers to successful unionization of the South is the race integration question. When properly played up by the employer, it can often really hurt where it counts—in representation votes. And it seemed to have hurt the Textile Workers' union when it attempted to organize the North Carolina Sharnay Hosiery Mills.

Just before the election Sharnay passed out a letter stating:

The union is strongly for integration.

It submitted a pro-integration brief to the Supreme Court.

Its parent (AFL-CIO) gave $75,000 to NAACP.

The TWUA agreed that there had been no threats, promises of benefit, or coercion. Just the above pro-intergration statements.

The Board held that the mere mention of a racial issue was not enough to upset the election. It said "we have not, in the past, attempted so to limit campaigning, but have relied on the good sense of the voters to evaluate the statements of the parties."

But the Board expressed "concern over the injection of the racial issue in any election."

Supporting Employee Committees

Remember the employee committees of World War II? They were encouraged by the War Production Board to boost production in critical industries. As a rule there were no membership requirements, no dues, no funds, and often no officers. Committees were elected annually by the employees and met monthly with management on company time and at the plant. They were not too far different from the ancient junior board of directors some companies had.

Cabot Carbon Comany's committee was set up substantially on this basis. It talked to management about safety, efficiency, and conservation of supplies. But at no time was there any bargaining about wages, hours, or working conditions, said Cabot's director of industrial relations. And the committee existed alongside of a union. There was no trouble at all until the company was accused of the unfair labor practice of assisting and supporting a labor organization.

But the U.S. Court of Appeals at New Orleans said that this employee committee was not a labor organization as understood by the Taft-Hartley Act. Thus it was OK for Cabot to assist and support the committee.

With the variety of responsibilities in the plant assumed by the union these days, it's often hard to distinguish in operation between the World War II committee and a labor organization. But this court did. It readily agreed that most other courts have held a committee of this sort to be a labor organization but it made much of the fact that never before in other cases had congressional intent been explored.

Insurance for Laid-Off Workers

Laid-off employees are considered employees of the company for one, two, or three years depending on the contract's provisions. Unquestionably they must be recalled when there's an opening. But to add to their recall rights, the right to group life, and accident and health insurance for the period of layoff would impose

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Handle and frame wipe clean with a solvent dampened cloth. Sliding end caps rinse clean in just 2 inches of cleaner. Hand grip is threaded for standard extension handle.

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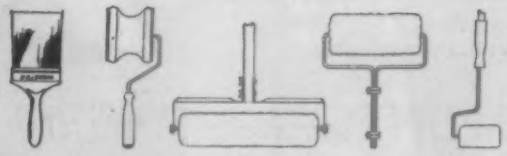


Exploded-Tip Brushes | Wooster PipeKoter | Wide-Boy Rollers | Long-Boy Rollers | Wooster Traffik Liner

THE WOOSTER BRUSH COMPANY
WOOSTER, OHIO

Begins on page 184

substantial unproductive costs on the company. You can ask the National Lead Company about it. An arbitrator recently imposed just such costs on them.

The Company's union contract called for medical insurance for "the employees." Arbitrator Elmer E. Hilpert ruled that when a laid-off employee retains his seniority for two years, he also continues his employee status. Therefore, coverage must be maintained for the two years of layoff.

The company had futilely argued that under the contract it had to furnish insurance in accordance with the rules and regulations of the insurance company; and under these rules no coverage was available for laid-off employees. Hilpert was unimpressed. Under the insurance company rules, "terminated" employees were not entitled to coverage. But who were "terminated" employees was left up to the employer.

In another case with another arbitrator, the employer's past practice rescued him from this costly fate. He was required to carry insurance only for those employees "on the payroll."

"Available Job" Defined

A job is not "available" if someone is holding it down, ruled an arbitrator.

The contract provided that a partially disabled employee will be placed in any available job he can do. This partially disabled employee was fired because there was no open job he could do.

He argued—and lost—that he could bump another employee with less seniority.

* * *

No secrets, please. A U. S. Court of Appeals at New York created a "first" in labor relations by ordering the NLRB to show the employer, for use in cross-examination, a written statement made by a union organizer to the Board. The statement was used by the organizer during the hearing to refresh his memory. This was ordered pursuant to the U. S. Supreme Court's Jencks' case, which gave defendants access to theretofore confidential data acquired by the FBI.

Hearing protection. Loss of hearing is becoming an increasingly important reason for paying out workmen's compensation money. For ideas on a loss-of-hearing safety program, write to Employers Mutual Of Wausau (Wausau, Wis.) for a free copy of *Industrial Noise and Hearing Protection*.

Sacred contracts. A contract is "a sacred thing" said United Steelworkers President David J. McDonald before a House Banking Committee. Wouldn't dream of foregoing any contract-scheduled raises.

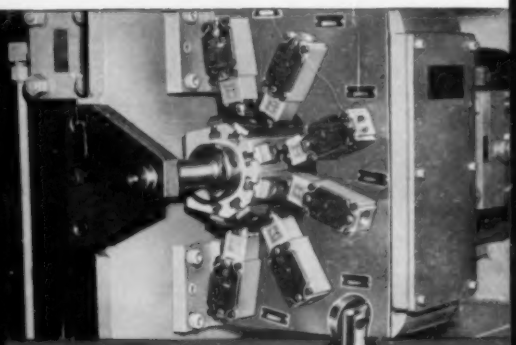
States control annuities. A U. S. Court of Appeals confirmed a District Court holding that equity or variable annuities are insurance matter to be regulated by state insurance departments and not the SEC.

ALLEN-BRADLEY

BULLETIN 802T

OILTIGHT

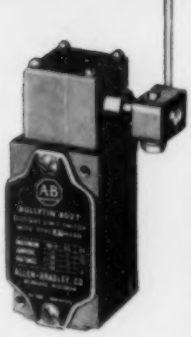
LIMIT SWITCHES



Radial mounting of six Allen-Bradley "manifold" type, push roller, oiltight limit switches.

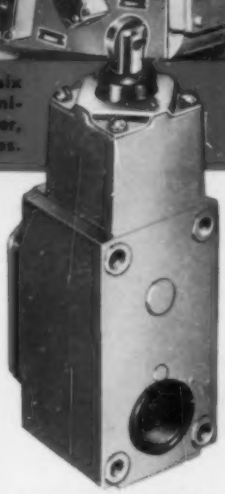
SIDE PUSH ROD

FORK LEVER TYPE

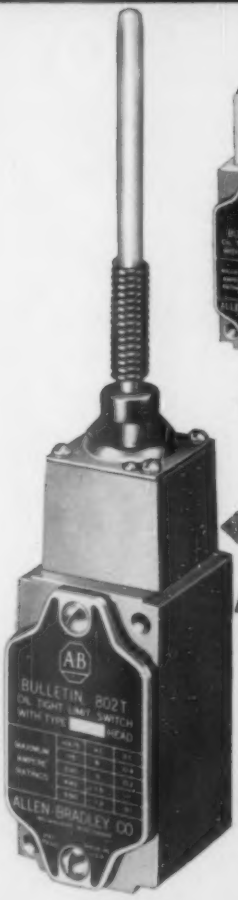


ADJUSTABLE ROD

TOP PUSH ROD WITH PLASTIC WINDOW



Push roller, oiltight limit switch, showing rubber grommeted wiring hole on back of "manifold" type, used on above automatic production machine made by Cross Company, Detroit.



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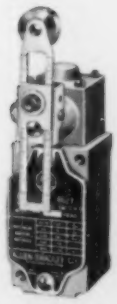

ADJUSTABLE ROLLER LEVER

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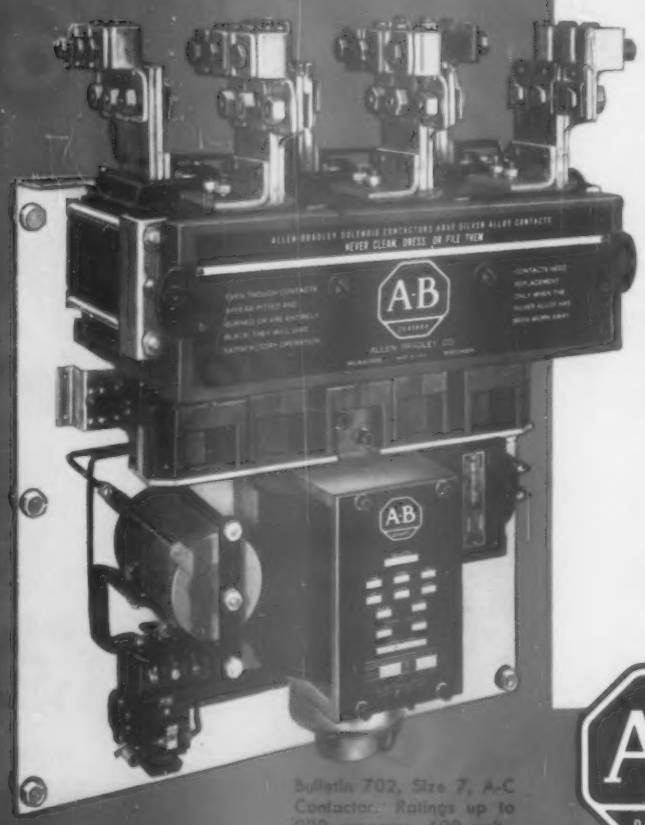
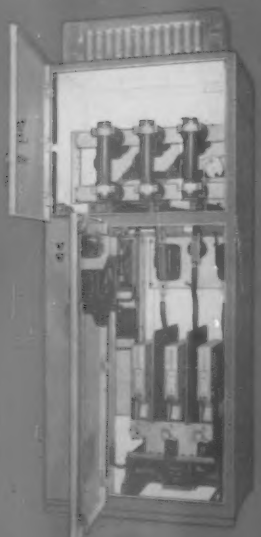


Bulletin 702, Size 7, A-C Contactor. Ratings up to 900 amperes, 600 volts. This basic solenoid contactor is used in large A-B low voltage starters.

The heart of Allen-Bradley high voltage starters is this air break, solenoid type contactor—rated at 400 amperes, 2300 or 4600 volts.

Bulletin 709 across-the-line solenoid starters are made in ratings to 300 hp, 220 v; 600 hp, 440-550 v.



A-B high voltage starters are built for all types of motors. Ratings to 1,500 hp, 2300 v; 2500 hp, 4600 v.

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MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

10-58-AP

The Cost Crisis

Costs, rather than demand,
determine today's prices—and profits.
If you're a medium-sized manufacturer,
here's a way to improve your cost picture from within

Today, economists are confirming what many businessmen have long suspected. Prices, they say, no longer rise and fall with the demand for a product. Instead, they're solidly tied to a company's costs – the generally rising, almost inflexible costs of labor, raw materials, sales.

Who suffers from the change? Not the larger corporations. They're the ones who *set* the prices – set them on their own more workable cost structures. It's the small and medium-sized manufacturer who feels it most. For one thing, he hasn't the capacity, or the cash, to buy in volume. For another, his very size limits the latitude of his operations . . . allows but little room to absorb today's added costs and still protect his smaller profit margin.

Caught in this dilemna, many businessmen are searching for a way to improve their cost picture and to hold, or increase, their profits. What's needed, they agree, is a system of modern management control. But how do you get it without undue cost and complexity?

The answer is with new Keysort machines and methods.

Keysort gives you fast, accurate reports in such areas as sales and order analysis, labor distribution, work-in-process, inventory, job costing...helps you spot money-losing situations *fast*. Thus, with Keysort, you can better determine labor and material requirements, step up the rate of inventory turnover, tighten costs, concentrate on known high-profit products.

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BOOKS

By CARROLL W. BOYCE, Manager
Features and Departments, FACTORY

Survey of Operations Research

After several years of waiting, we've finally seen an almost completely non-mathematical book-length survey of the whole field of "operations research." There isn't even a hint of calculus (and very little algebra) in *New Techniques for Management Decision Making*.

The author wrote this book to familiarize his associates at the consulting firm of McKinsey & Company with what he and his mathematically inclined colleagues could do. The result is an exposition in almost narrative form. It's clear; it's concise; it's easy to read. (Only drawback is a plastic ring binding for punched pages that makes page-turning awkward and page-tearing a real hazard.)

The OR practitioner or the sophisticated statistician or industrial engineer won't find any technical information here that they haven't known long since. But even these men will find the book useful in providing some of the simple explanations they have been groping for on the purpose and practical applications of the new mathematical techniques.

The non-mathematical manager will find this book helpful two ways. It will give him . . .

. . . *A picture of what kinds of things* have been done and can conceivably be done by specialists to help him solve his operating problems.

. . . *An appreciation of the complexity* (and therefore cost) of these techniques—but it won't do this by overwhelming and confusing him with high-power math.

Having done these two things, it will also put him in a good position to resist a "snow job" by a fast-talking staff man or consultant who may be just itching to hire a million-dollar computer—possibly to tackle a four-bit job.

No manager is going to become an expert reading this book. We can't even guarantee that he will know enough to be able to "discuss the subject intelligently" if his co-discusser should insist on going into technicalities. But he will be in a good position to discuss (and, within limits, evaluate) possible applications of such techniques as probability, queuing, information theory, game theory; linear, dynamic, and quadratic programing; simulation, and Monte Carlo.

Not to be missed are a half-dozen pages in the section on applications that deal with systems reliability and maintenance. It'll give you an economic perspective on preventive maintenance that's almost universally lacking today.

It's our hunch that this book will make a major contribution to management thinking and understanding in a field that holds great promise but has been retarded by mathematical double-talk.

By Franklin A. Lindsay. McGraw-Hill Book Co., 330 W. 42 St., New York 36. 173 pages. $15.

Numerical Control for Machine Tools

The Chicago consulting firm of Cox & Cox has come up with a stimulating and useful analysis of programed tools, with emphasis on the problems (and advantages) of early installation. *Numerically Controlled Machine Tools—Implications for Management* is really a "report to management" more than it is a book in the conventional sense. While the $25 price tag sounds stiff for a book, it's a bargain for a competent consultant's report. If your company has any programed tools, or is considering them (and it should be doing so), you'd better get this book.

We noticed three shortcomings, one of which is easily overcome, and one which is inherent in any "generalized" consulting report:

. . . *There's little information on hardware (controls)* currently available for machine tools. FACTORY's special report (February 1958) provides a good survey of the field; a magazine like our sister publica-

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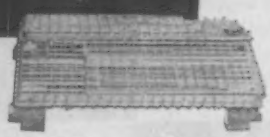

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Begins on page 192

tion CONTROL ENGINEERING will keep you up-to-date.

. . . *The material can't, in its very nature, get specific* about "your problems." But it does as well or a little better than most general reports on this score.

. . . *Cox & Cox appears to have a pat answer* to questions involving the personnel and organization for assessing the possibilities for the company in programed tools. It looks like a rather heavy superstructure of committees. If you rebel against committees (and many companies are doing so these days), you may find yourself at odds with the party line. The "do-it" tone in which the whole report is written can be particularly annoying on a point like this.

By H. Clifton Morse and David M. Cox. Privately published by Cox & Cox, 333 N. Michigan Ave., Chicago 1. 186 pages. $25.

New Reference Book

Every company library is going to want a copy of *How and Where to Look It Up*. If you don't have ready access to a company library, you may want one for yourself. The catch is that you won't find answers here—only information on where to find the answer. So unless the volumes referred to are available, this book isn't much help.

There's an extensive index, plenty of cross-referencing. But it's not tailored specifically to the business man (you shouldn't expect it to be—it's general reference). We made this "test": Handiest place we know to look for figures on employment, value of product, hours and wages, labor force, etc., is the *Statistical Abstract of the United States*. Took us better than 15 minutes to locate it under the heading "U. S. Geography" with cross-reference to "Statistics" and "Vital Statistics." Admittedly, knowing the book's title, we could locate it in the index in nothing flat; but that's exactly what you *don't* know when you start seeking sources of information. We thought maybe we had hit pay dirt when we found "production data" listed under "manufacturing"

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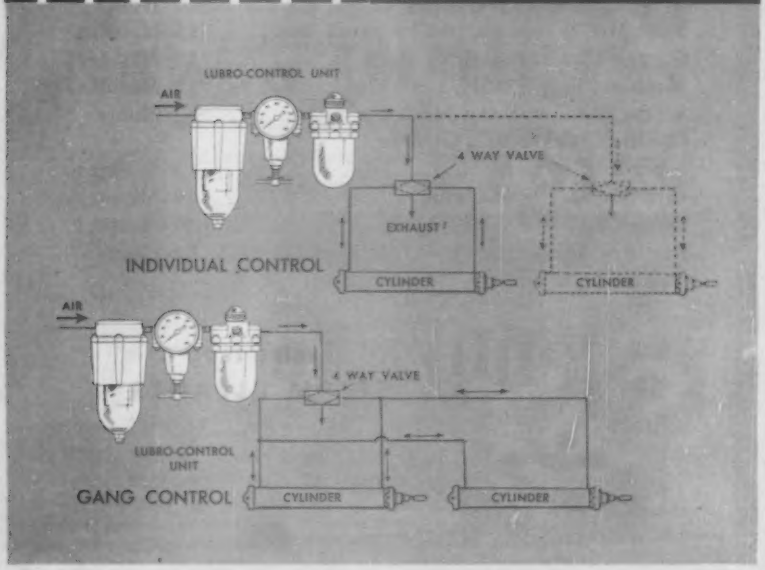

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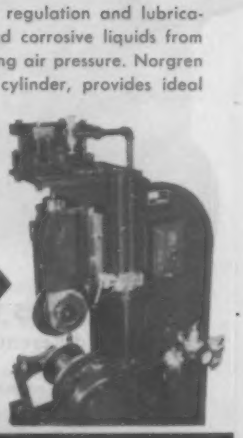

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Begins on page 192

in the index; but that gave us a single reference—to E. S. and V. S. Woytinsky's *World Population and Production*. A most distinguished study, and it might have the information we need—but how many of us have this tome on the top of our desks?

Other items of keen interest to the operating executive for which there is no direct index listing: maintenance, materials handling, industrial engineering, time study, production control. Missing from among the reference works covered are two of the most important of recent years (to the plant executive): Maynard's *Industrial Engineering Handbook*, and Morrow's *Maintenance Engineering Handbook*.

For sheer size, the book looks frightening. However, it's printed on coarse, thick paper, so it's only about a third as many pages as it seems at first glance. The type is large and easy to read.

One feature might make this book worth its price even if it's never used as intended: Excellent brief appraisals of most of the great and standard reference works in the English language. Once you know the title, you can get a fair idea of breadth, depth, and up-to-dateness of any reference you may be considering buying.

By Robert W. Murphey. McGraw-Hill Book Co., 330 W. 42 St., New York 36. 721 pages. $15.

Hydraulics in Brief

With the current trend to increasing use of hydraulic equipment in industry, many companies will find good use for *Trouble-Free Hydraulics*. The very apt subtitle is "a practical handbook on maintenance and fault-finding in oil hydraulic machinery." Rather than a learned tome, it's a quickie (only 124 pages). While the British author tends to be a bit stiff in his writing style, he's clear and pointed. Could be a handy item to have around for either training or brush-up for both craftsmen and foremen.

By Ian McNeil. Ronald Press Co., 15 East 26th St., New York 10. 124 pages. $6.50.

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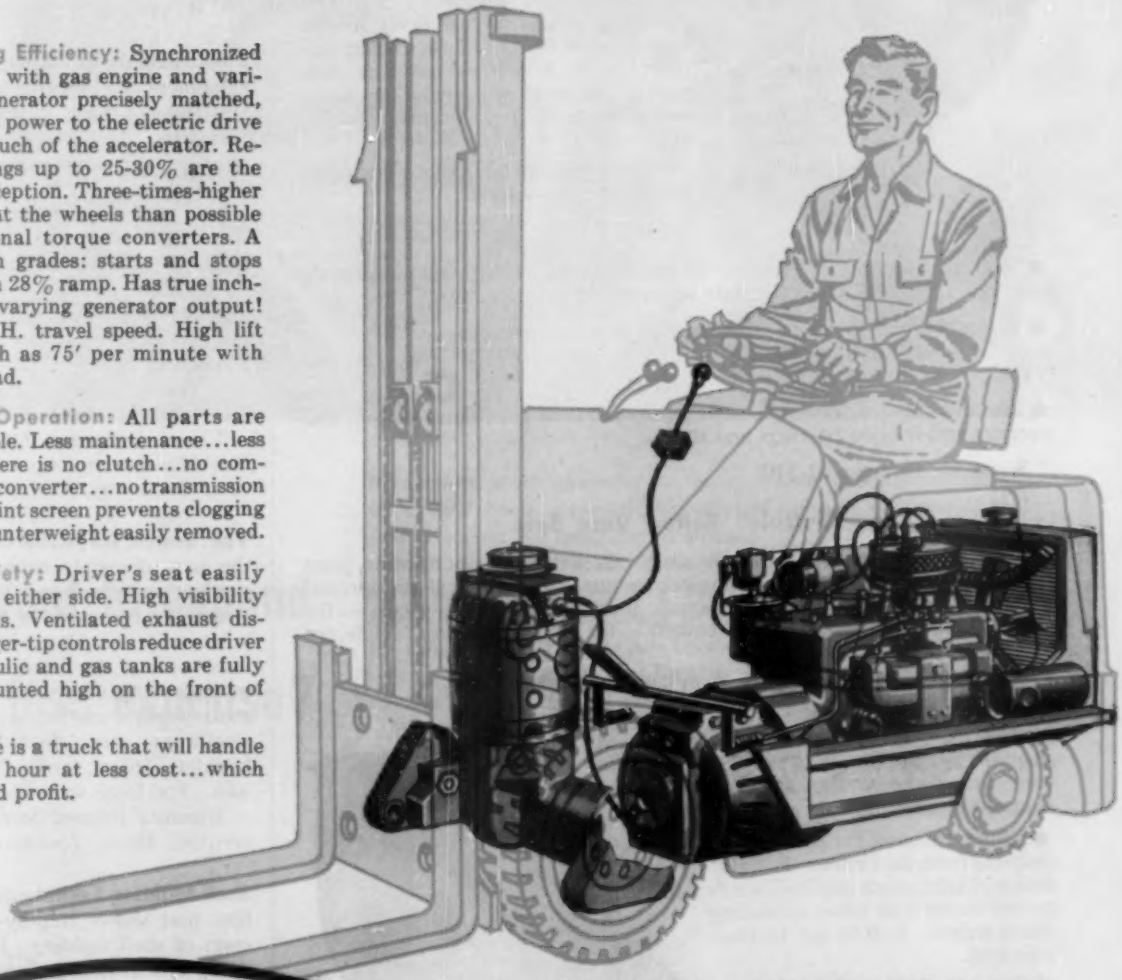

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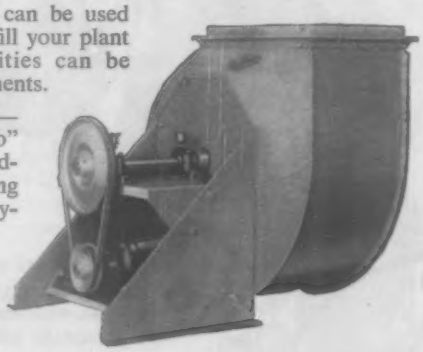

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Fundamentals of Management Development is a filmstrip series telling how management development—a systematic method of getting the most out of manpower resources—has become a key business strategy today. Kit consists of four filmstrips, each one covering a different phase of management development (what it can do, how to set up program, how to appraise executive performance, and how to develop a manager's skills), plus a Discussion Guide booklet. 35mm, color, sound, 83 min. For purchase, write:

Visual Education Dept., American Management Association, Inc., 1515 Broadway, New York 36.

The Search for Reliability depicts the new demands being made on product and producer. Basic theme is that today's world is increasingly automated and electronically regulated—thus, the need for higher product reliability. All the parts must work, even the seemingly insignificant ones. Includes helpful booklet. 16mm, color, sound, 28 min. For loan, write:

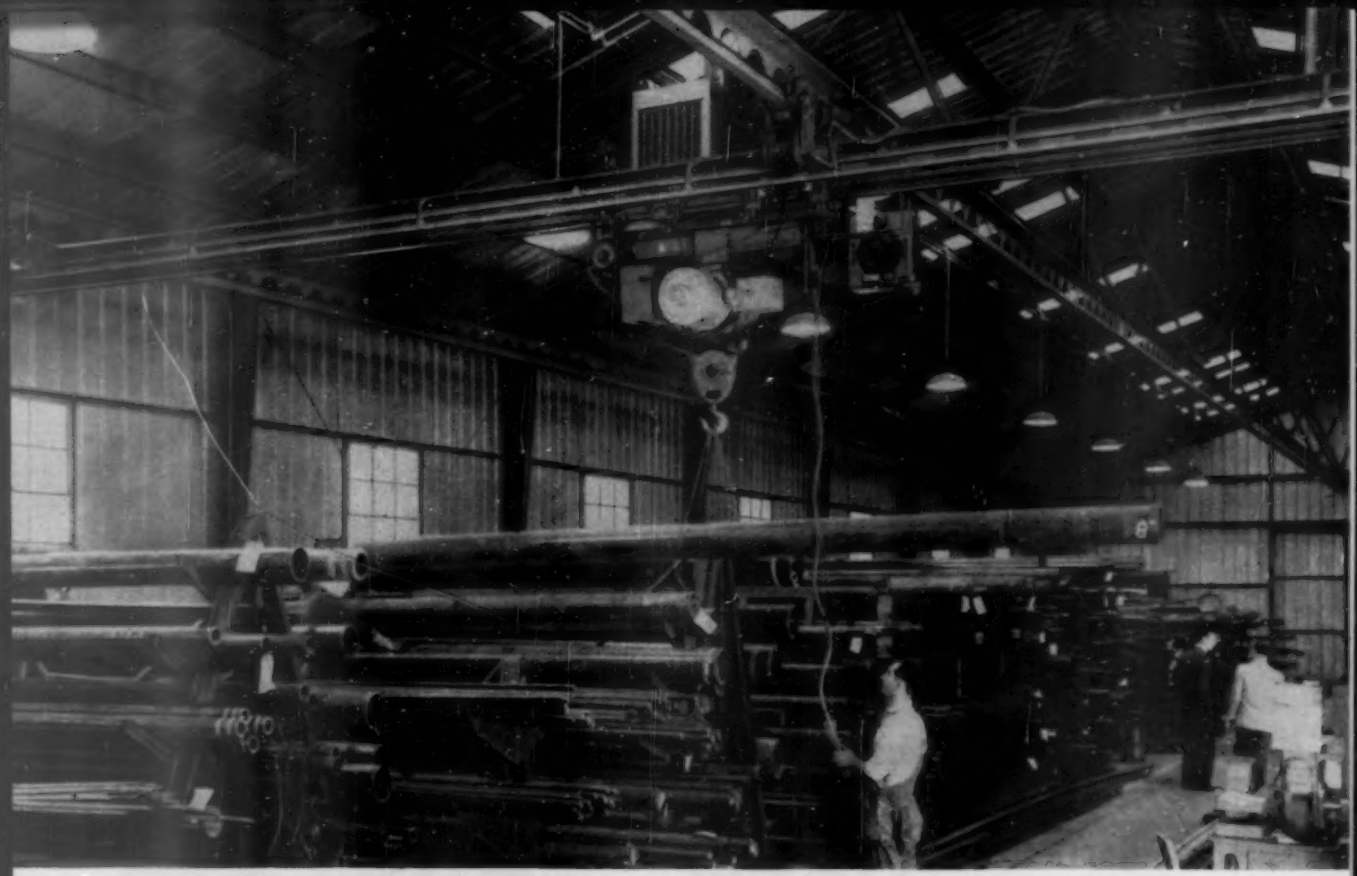
Standard Pressed Steel Co., Advertising Dept., Jenkintown, Pa.

Shell Molding Techniques is a slidefilm that shows step-by-step processes of shell molding. It describes dump-box mixing and sand coating, as well as production of dumped and blown shells and cores. 35mm, color, sound, 20 min. Write:

Dept. SM, Monsanto Chemical Co., Springfield, Mass.

Selected Motion Pictures 1958-59 is a 40-page catalog describing several hundred free and rental 16mm sound motion pictures in various fields. For copy, write:

Association Films, Inc., 347 Madison Ave., New York 17.



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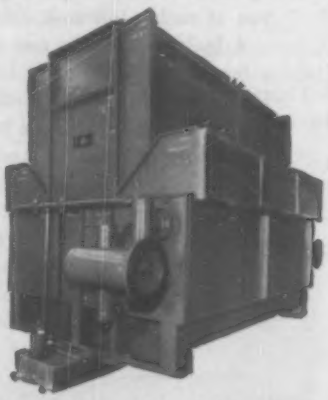
ECONOMICAL COOLING OF GASES AND COMPRESSED AIR



Cooling gases or cooling and removing moisture from compressed air, the Niagara *Aero* After Cooler offers the most economical and trustworthy method. Cooling by evaporation in a closed system, it brings the gas or compressed air to a point below the ambient temperature, effectively preventing further condensation of moisture in the air lines. It is a self-contained system, independent of any large cooling water supply, solving the problems of water supply and disposal.

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Write for Descriptive Bulletin 130.

NIAGARA BLOWER COMPANY

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16 Maintenance Soft Spots to Hit for Savings. Where to hit maintenance for cost cuts that really add up. **FC-8**

Those Hidden Handling Costs. Case histories of five companies that ferret them out, thus spot opportunities for improvements and cost cuts. **FC-9**

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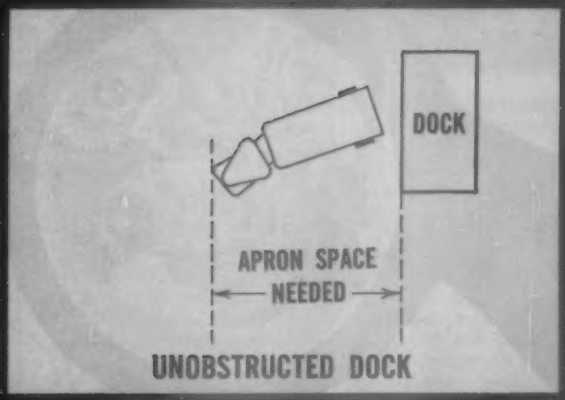
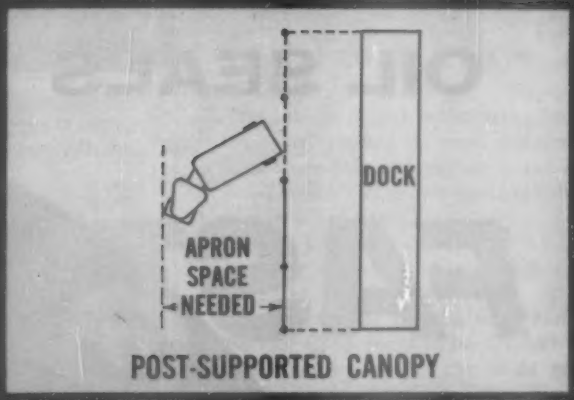
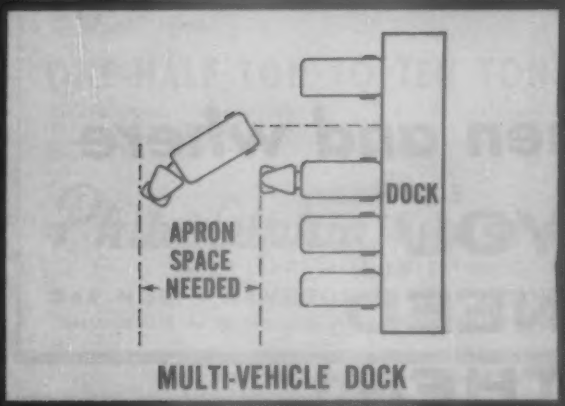
WHAT TRUCKS NEED FOR MANEUVERING AT LOADING DOCKS



UNOBSTRUCTED DOCK



POST-SUPPORTED CANOPY



MULTI-VEHICLE DOCK

DOCK WITH DRIVEWAY AND STALLS

SOURCE: Fruehauf Trailer Co.

APRON SPACE NEEDED FOR ONE MANEUVER INTO AND OUT OF POSITION

	OVER-ALL LENGTH OF TRACTOR-TRAILER (Dimensions in Feet)								
	35			40			45		
WIDTH OF BERTH	10	12	14	10	12	14	10	12	14
DEPTH OF APRON NEEDED	46	43	39	48	44	22	57	49	48

How to Get No-Jam Truck Traffic

Choked-up shipping and receiving areas can sour your production schedule, cost like crazy, frazzle tempers. These guides will make traffic really flow.

HARDENING of the arteries isn't just a human malady. Your plant can suffer, too. When plant trucking areas have tight, hard arteries, results can be nearly fatal. How do you recognize it? You don't have to be a medicine man. Just look for any of these symptoms:

. . . *Congestion* of trucking lanes for shipping and receiving.

. . . *Choking off* of major access highways by waiting trucks.

. . . *Hazards* for pedestrians during lunch and shift changes.

. . . *Pile-up* of finished products on your shipping dock.

. . . *Cluttered turn-around* and maneuvering space for trucks.

Leaking profits—If you have any of these symptoms you may as well get set for more woe. For drab as the picture may look, it isn't half as drab as your books will look when

By CHARLES A. GOODWIN
Traffic and Transportation Engineer
Liberty Mutual Insurance Co., Boston

you consider these further drains on a profitable operation:

. . . *Machines and employees* exposed to heavy traffic on aisles and intersections.

. . . *Incoming materials* delayed in inspection, transfer, final storage.

. . . *Production areas* overcrowded with intermediate storage.

. . . *Assembly lines* that don't get materials at a uniform rate.

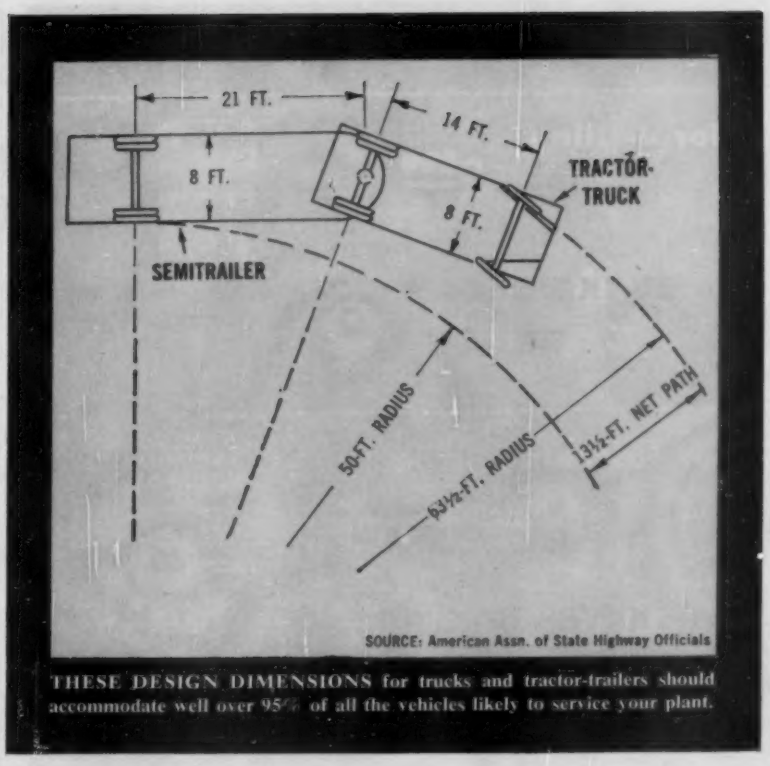
Take two plants as examples. They're good, everyday plants—the kind you'll see nearly anywhere. Maybe just like your own plant. Yet they're pretty typical of the poor planning and congestion that run receiving and shipping losses up into the big money.

Trouble in Plant A—Shipping and receiving are combined at one dock just inside main gate. Dock accommodates eight trailers. Daily traffic: 42 tractor-trailers—10 for receiving, 32 for shipping. Average turnover: Four trailers per hour. Turnover period: 4 hours to a half hour.

Because dock apron and berth space is only 50 feet over-all, trucks must maneuver on driveway. At peak, up to 12 trailers compete for a berth. Main driveway is used for parking strip. All this causes congestion that delays carriers, closes off major access driveway to both plant and emergency vehicles. Also it subjects pedestrians to hazards during lunch and shift changes. Finished products pile up on dock and shipping floors waiting to be shipped, while tight maneuvering space makes accidents more likely.

Trouble in Plant B—Receiving dock can take three trailers and four freight cars. Truck section of dock is 44 inches high (6 to 8 inches less than tailgate height). Freight car floors come one foot below platform edge. Incoming bulk material is handled manually, with some help by fork-lift truck. But the fork lifts can't enter truck bodies. Rope slings have to help move heavy loads. Workers are in danger of strain.

Loading dock is 50x90 feet—inadequate. Productivity is handicapped: Machines and employees contend with heavy traffic on all aisles and intersections. Production areas are overcrowded with stored materials while assembly lines get sporadic supply of materials and parts. Materials hit bottlenecks in inspection, transfer, final storage.



THESE DESIGN DIMENSIONS for trucks and tractor-trailers should accommodate well over 95% of all the vehicles likely to service your plant.

If these two plants reflect any of the conditions in your own plant—or if you want to avoid such conditions in that new plant you're planning—maybe you had better take a fresh look at three things: plant yard approaches, maneuvering space, and loading docks.

CHECK APPROACHES

Signs of trouble—Are plant roads from the front gate to your loading dock prey to all kinds of troubles? For example, do trucks have to fight parked vehicles? What about random storage of materials next to roads? Are roads marked for speeds, lanes, cross-movements?

Better ask yourself about surfacing, too. Deeply rutted and poorly drained driveway surfaces can shift freight in moving trucks, damage bodies, steering mechanisms, couplings, springs. Curves—especially at intersections—can cause trouble, too, if they aren't gentle enough for easy maneuvering. The harder it is for trucks to move in and out, the harder it is to keep roads clear for other trucks. Bad visibility on sharp corners just makes matters worse. And sharp corners mean that rear wheels jump the curb.

Standards to shoot for—Here's what we recommend as standard for plant yard approaches:

. . . *Make each roadway* at least 20 feet wide. Each truck is 8 feet wide. Any road less than 20 feet invites trouble.

. . . *Eliminate alleys.* Narrow approaches (less than about 15 feet) are unsuitable.

. . . *Control mixed traffic.* Keep trucks, cars, and pedestrians as far apart as you can. Line off your roadways with 6-in.-wide lines for vehicles and pedestrians. Minimum widths for lanes: 4 feet for pedestrians, 8 feet for plant vehicles, 10 feet for trucks. Thus a 24-ft. driveway can meet minimum requirements for all mixed traffic if there are no marginal obstructions.

. . . *Keep proper roadways.* Surfaces should be even, structurally sound, slightly crowned, well drained.

. . . *Curve gently.* Right-angle driveway intersections should be designed with turning radii of at least 35 feet—in fact, 50 feet is comfortable (illustration above). Trick to remember is that wheels don't form a true arc—they describe a transition curve because of cornering forces and slip angles.

Turn the page

Air tools are built for working, not for sleeping. Even the amazingly muffled Buckeye QUIETOOL drills, sanders, screwdrivers and nutrunners won't lull you to sleep! But they do their work with precise efficiency, and make less exhaust noise in the process than you ever believed possible of an air tool.

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A letter or postcard, with your name, your company name and address, and the single word QUIETOOL, will bring complete information and, if you like, an obligation-free trial-test right in your own plant.

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NO-JAM TRUCK TRAFFIC

Begins on page 202

. . . *Open the gates wide.* We recommend these dimensions for plant gates: For one-way roads, turning radii of 35 feet, gate width at least 20 feet. For two-way traffic, same turning radii, 30-ft. gate width.

KEEP APRONS CLEAN

Signs of trouble—We call space where trucks maneuver the apron space. Here are some common substandard conditions that we find in this area: Materials are stored in the apron space so that clear depth is less than 40 feet. Pedestrian and plant vehicular traffic uses the apron space along with the trucks. Trucks must back down (or up) steep grades or over spur tracks, or must have wheel blocks to hold them in place at the loading dock.

Standards to shoot for—Here's what we think you should have:

. . . *Give yourself 100 feet* from the edge of the loading dock to the opposite curb, or nearest opposite obstruction. The rule is that the distance should be not less than twice the over-all length of the longest servicing vehicles. Suggested design standards worked out by the Fruehauf Trailer Company and approved by the American Trucking Association appear in the illustrations (pp. 202-03).

. . . *Make it solid.* Apron space should be well paved with a dustless, durable material. Also you should grade the surface to let water run off easily and quickly.

MAKE MANEUVERING EASY

Signs of trouble—Loading docks are the third crucial area where substandard conditions can control your whole operating plan. Here are the things to be wary of: Narrow or unmarked parking (or spotting) positions for trucks are the first invitation to trouble. Then if wheels sink or slip under loads, tailgates edge farther from the docks and make loading a nightmare. If platform height and width aren't sufficient, workers are handling freight work under a severe handicap. Dock plate misuse is another trouble sign. A loaded truck sits three inches lower than an unloaded

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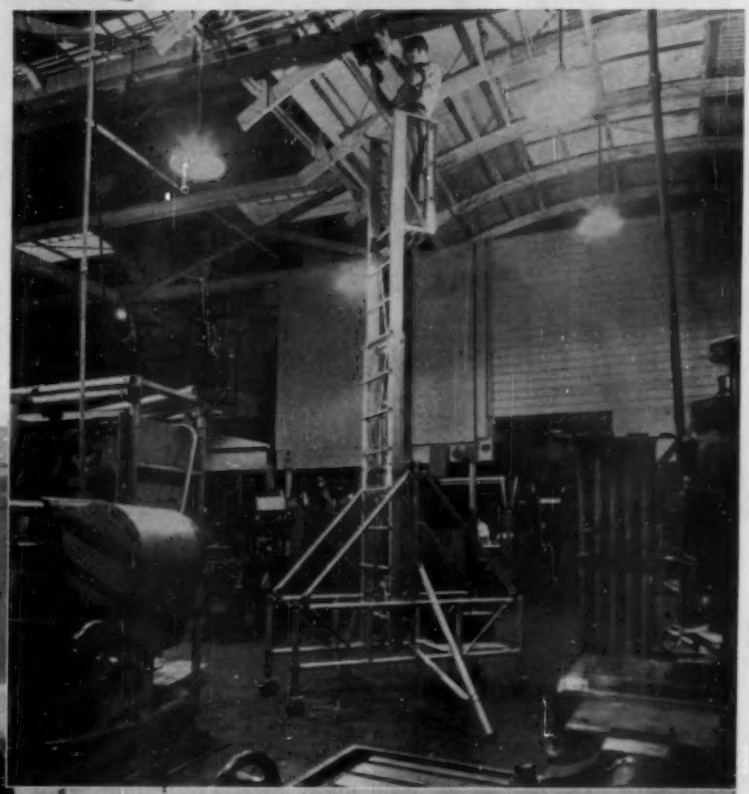

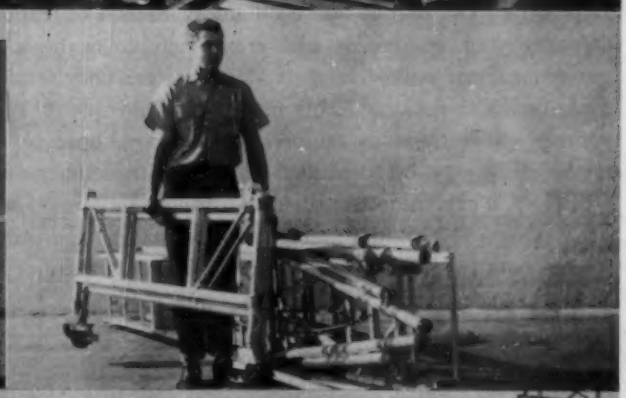

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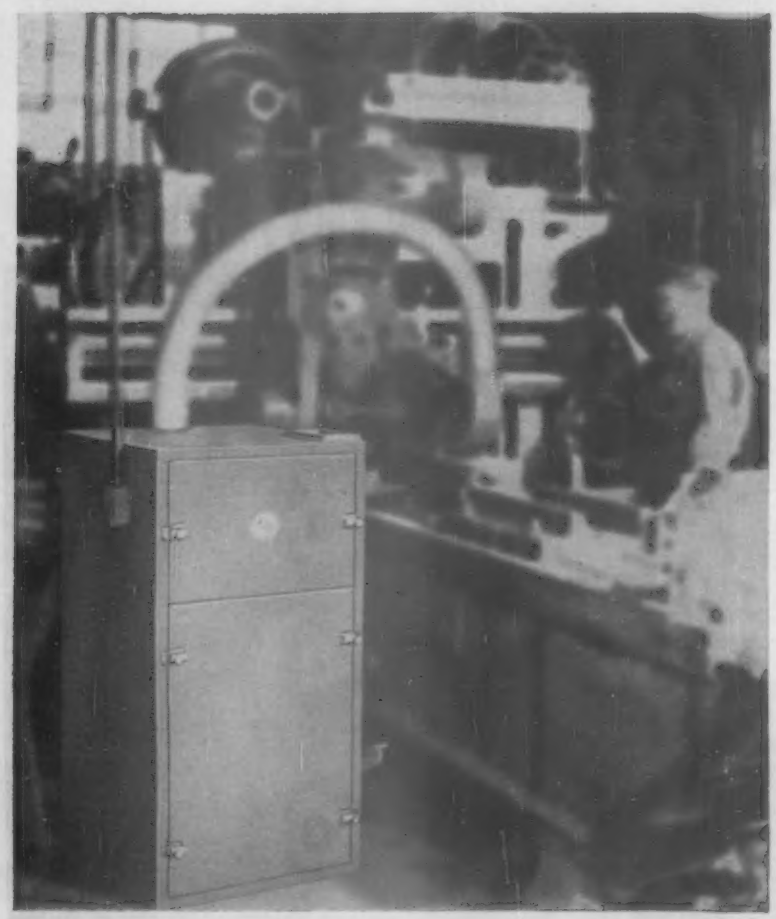

How *unitized* Torit Dust Collectors cut your costs . . . protect machines and worker morale

Here's the most flexible and economical method of trapping dust that damages your equipment and creates employee health and morale problems. Torit units trap dust at its source. They're completely self-contained and portable. This means you can install Torit Collectors yourself, shift them as requirements change, operate them only as needed. They can be suspended or installed next to the machines they service. You can wire them directly through equipment switches to conserve power and let them return filtered air to the room to save heat. There's a complete range of types and sizes.

6 machines serviced by Torit for $666.15 complete. This Torit Model 219FM was installed at the Mohr Lino Saw Co., Skokie, Ill. to collect dust from 3 belt sanders and 3 different types of grinders (2 grinders hidden from view). The Collector *plus* all accessories were supplied by Torit at a total cost of $666.15—another example of the economy and efficiency Torit offers you.

For more FREE facts on dust problems and dust control, write:

TORIT MANUFACTURING COMPANY
311 Walnut Street, St. Paul 2, Minn., Dept. 305

NO-JAM TRUCK TRAFFIC
Begins on page 202

truck, so you've got to use your dock plates properly to neutralize this height difference. Using the same area for shipping and receiving is often necessary but almost always inefficient and hazardous.

Just remember this: The dock is supposed to be for shipping and receiving, not for storage. Keep it clean and you'll be on your way to working at greatest capacity and greatest efficiency.

Standards to shoot for—Here are what we consider proper standards for loading docks:

Make truck berths 10 to 14 feet wide. Twelve feet is an acceptable average. Yellow guide lines (4 to 6 inches wide) will keep limits of each spotting position clear.

. . . *Pave the berths solidly.* Keep in mind the concentrated loads of wheels and landing gear and the possible rutting and sinking of wheels into ill-paved berths.

. . . *Use bright wheel chocks* for brake-failure protection.

FIGURE DOCK DIMENSIONS

Five dock dimensions—Observe these minimum standards:

. . . *If you've got a recessed loading dock* within your building (no outside apron except for sidewalk and street), truck berths should be no less than 35 feet in depth and no less than 12 feet wide, with 12 to 14 feet overhead clearance.

. . . *Loading docks for either shipping or receiving* should have the following specifications: Height (pavement to floor)—44 to 52 inches, with 50 inches preferred for large trailer units. Width—8 feet minimum, with 12 to 15 feet preferred. Area—preferred minimum, two times the body floor area of the average vehicle using each berth.

. . . *When the outside loading dock is separated* from the main shipping or receiving floor by doors, these doors should be overhead units attached to columns that will provide at least 12-ft. openings.

. . . *You should have a canopy* with gutters to protect freight and workers in bad weather. The canopy will also eliminate any hazard from wet docks or plates.

Turn the page

For more facts circle 578 on Reader Service Card
For more facts circle 579 on Reader Service Card →

Self-propelled Austin-Western Hydraulic Crane with all-wheel steering makes short work of transporting this heavy tank through low-clearance entry to fabrication bay.

Tight spots, low clearances... no problem for highly maneuverable Austin-Western hydraulic crane

says Linde Co. rigging foreman, S. L. Chudy

"The Austin-Western Hydraulic Crane is a highly mobile and extremely adaptable piece of equipment in our operation." That's what Mr. S. L. Chudy, rigging foreman of the Linde Co., Tonawanda, N.Y., has to say about the versatile A-W crane.

The Linde Co., a division of Union Carbide, among other products produces oxygen and nitrogen manufacturing equipment.

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"We make good use of the mobility of this rubber-mounted crane. Our plant covers 65 acres. Some areas have rough, unimproved surfaces. That's where all-wheel drive is especially handy for steady power to move loads easily over uneven ground.

"This crane has been dependable. That's important. When material is needed in the fabricating bays, it's our job to deliver. Even in heavy snow or mud the A-W has plenty of power and traction... without chains.

"We're always finding new uses for the crane. Except for a locomotive, the A-W is the best equipment for shuttling railroad cars.

Maneuverable, speeds freight unloading

"It's easy to maneuver into the tightest spots because of its all-wheel steering. The crane can get right in close, to speed freight car unloading. Often it takes material direct from the car to storage areas.

"All 11 pieces of our materials handling equipment are radio equipped. Other departments of the plant frequently radio requests to borrow the A-W.

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"Operators like the Austin-Western, too. We rotate job assignments so all equipment operators get a chance to be thoroughly familiar with all types. It's easy to operate. Every operator can use the crane as a precision tool.

"We use the A-W to handle raw materials, fixtures, jigs, lumber and finished products."

Investigate! Learn how this versatile new hydraulic crane, with 18-ft. telescoping boom, 5-ton capacity, and full circle boom rotation, saves materials-handling dollars. See your nearby A-W distributor or write us today for complete information.

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NO-JAM TRUCK TRAFFIC

Begins on page 202

. . . *Install protective bumper guards* along dock edge to muffle shocks of trucks backing into dock. This will minimize damage.

WATCH YOUR DOCK PLATES

Eight hints on dock plates—You'll do well to follow these guides:

. . . *Make plates strong enough* to support maximum loads plus handling equipment.

. . . *Anchor them if necessary*. You don't want motion in the plates, so be sure they won't wobble or slip under a load.

. . . *Make sure your plates can ride up* at least 10 degrees to reach any truck level, because you'll always have variations in height among different trucks.

. . . *Avoid manual handling* of the plates, unless they happen to be made of light alloys.

. . . *Make certain your plates* (if you're using fork-lift trucks) are three feet wider than the trucks and flare out another two feet at the dock side. This way your fork-lift can enter at an angle.

. . . *Make the plate surfaces non-slip*, especially if the plate is inclined when in position.

. . . *Provide good storage space* for plates when they're not in use (unless they're anchored in place). This will spare you tripping injuries, improve dock housekeeping.

. . . *Use powered dockboards or ramps* if plates won't do. A number of automatic devices are available to raise or lower dock edge height or truck bodies.

Most plants use the dock area for both receiving and shipping. It's not recommended, but it need not cause any trouble if you're careful to keep a tight control on the loading areas. In any event, keep shipping and receiving apart, even if it means a truck has to change position. It's better for the driver to be inconvenienced than for you to be confused.

If you have systematic spotting and stacking of freight, enough people working, good handling equipment, reasonable schedules, wide aisles, and good lighting, you should have clear sailing. **END**

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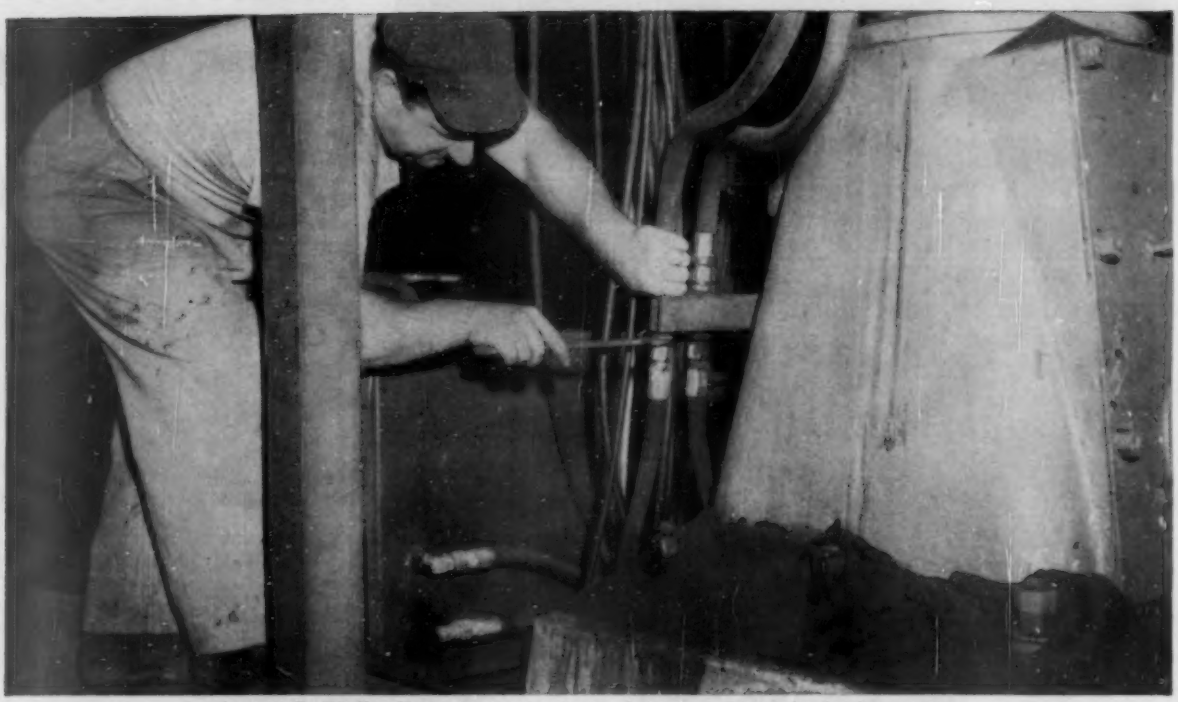

Aeroquip Flexible Hose Lines resist vibration, shock and abrasion encountered in foundry operation.

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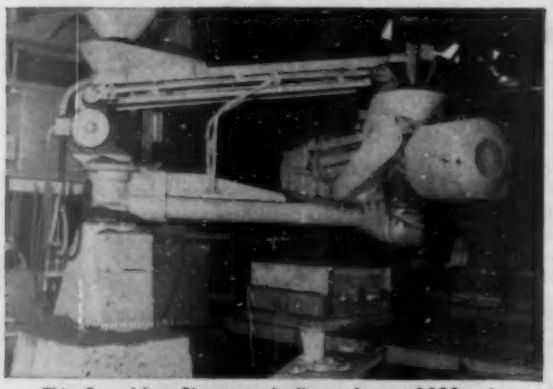

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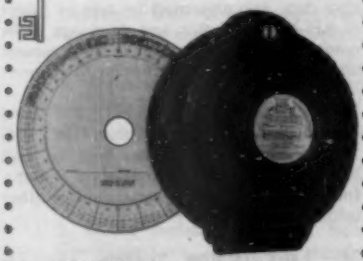

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For more about these items, circle numbers on Reader Service Card next to back cover.

ELECTRICAL

1—Secondary Unit Substations. Here's a 24-page bulletin (No. 3104-1A) with information for complete and compact load distribution centers for indoor or outdoor applications. Includes data on primary devices. *I-T-E Circuit Breaker Co.*

2—Switches. This 32-page catalog (No. 62c) has over 200 listings (with photos) of basic switches and devices. Among these are the high-precision roller lever switch, adjustable actuator, "pulse" and "coin" switches. *Micro Switch.*

3—Drives, Components. Bulletin D-2506, 16 pages, describes drives that provide precise, adjustable machine speeds from in-plant a-c circuits. Four-color photos. *Reliance Electric & Engineering Co.*

4—Lighting Equipment. Catalog C-58 is a 16-pager with details on maker's line of fluorescent luminaires. Includes info on diffusers and louvers, ballasts, other components. Tables of sizes, photos, drawings. *Wakefield Co.*

5—Calcium Stationary Batteries. Suggested uses and proper installation procedures of these batteries for full float applications are presented in 12-page GB1848. Engineering specs, photos, diagrams. *Gould-National Batteries.*

6—High-Frequency Equipment. Value of this equipment as a means of increasing the output or efficiency of high production machinery is pointed out in 12-page Bulletin No. 2250. Engineering data, photos, diagrams. *The Louis Allis Co.*

7—Vertical Syncrogear Motors. Bulletin F1957 (4 pages) describes line designed to provide rugged dependable internally geared power for agitator applications. Shows three types of motor enclosures. *U.S. Electrical Motors Inc.*

8—Wound Rotor Motors. Advantages of Tri-Clad No. 55 a-c wound rotor motors for either crane or general applications are described in illustrated Bulletin GEA-6713 (4 pages). Cutaway view shows construction. *General Electric Co.*

9—Air-Break Contactors. Here's an illustrated 6-pager (14B7303B) that presents facts about these high voltage contactors for control of large motors, primary switching of induction furnace transformers. *Allis-Chalmers Mfg. Co.*

10—Cable. Brochure (6 pages) covers portable electrical cable and points out the differences that distinguish one type from another. Includes condensed tables of technical data; also photographs. *Western Insulated Wire Co.*

11—Speed Drives. Two 12-pagers describe adjustable speed d-c packaged drives: EN-64 covers Ultraflex E electronic drive (1 to 40 hp.); EN-65, Ultraflex M magnetic amplifier drive (1 to 200 hp.). *Cutler-Hammer Inc.*

VENTILATING AND AIR CONDITIONING

12—Air Conditioners, Ventilators, Fans. Three bulletins: No. 2900 (20 pages) describes cabinet air conditioner; No. 2301-S (2 pages) has construction info on power roof ventilators; No. 257-S covers fans. *Ilg Electric Ventilating Co.*

13—Tubing. Three 4-pagers, an 8-pager, and a 1-pager tell all about flexible ducting for many applications. Give info on use of air conditioning and handling, fume removal, dust collecting, materials handling. *Flexible Tubing Corp.*

14—Fans. Here's a 16-page bulletin (No. I-585) that sets forth construction features and other info on line of fans. Capacities range from 1000 to 30,000 cfm. Includes tables of dimensions, diagrams, photos. *The Day Sales Co.*

15—Air Conditioning. Illustrated 72-page catalog (No. 39ACW-55) describes central station units for conventional and multi-zone applications. Tells how equipment can be chosen quickly; includes specs, rating tables. *Carrier Corp.*

MAINTENANCE

16—Pump Motors. This 28-page Instruction Manual (F1949) gives procedures for installing, inspecting, and servicing turbine pump motors, and other info. Includes trouble-shooting chart, tables, photos. *U.S. Electrical Motors Inc.*

17—Maintenance Management Programs. Here's a 12-page, 4-color folder (X-1820) that discusses maintenance management and all it involves. Also describes the detailed program as used in five different categories. *Sperry Rand Corp.*

18—Vacuumized Sweeper. Bulletin (4 pages) lists four main advantages for this sweeper: Vacuumized sweeping, eliminates dust nuisance, no need for water spray, works in tight areas. Has applications and specs. *G. H. Tennant Co.*

19—Floor Maintenance. Complete program for floor care is offered in eight illustrated one-pagers. Cover wet and dry maintenance; describe products and applications. *R. M. Hollingshead Corp.*

20—Hand Tools. Here's a 156-page guide covering tools for assembly, maintenance, field service, and original equipment repair kits. Lists tools of various shapes, sizes, with specs. Includes automotive tools. *Snap-On Tools Corp.*

21—Lubricants. Illustrated 20-page bulletin (BK-19-a) discusses "planned" lubrication. Provides a pre-tested, pre-established list of lubricants for specific equipment. Has specs, container sizes. *Keystone Lubricating Co.*

22—Powder Lance. This illustrated 4-pager (F-1153) describes a new tool that can slice through concrete or metal of any thickness. Accurate control of intense heat is said to be key to operation. Specs, other info. *Linde Co.*

AUXILIARY

23—Filter Equipment. "Master" catalog (148 pages) consists of four separate catalogs on filters for gasoline, diesel, gas, dual fuel engines. Part of a sales kit that includes "Cross Flow Filcron" (by-pass) samples. *Fram Corp.*

24—Compressors. Design and construction data are presented in 4-page folder (LAH-158). Photos and drawings show compressors in wide range of pressures and capacities. *Roots-Connersville Blower.*

25—Pumps. One 4-pager (Form 16A) and three data sheets (Forms 128, 135, 138) tell all about sleeve bearing, ball bearing nylon roller, and other pumps. Include lists of applications, photos, other info. *Hypro Engineering, Inc.*

26—Water Heating Systems. This 24-page manual contains instructions, tables, and charts to simplify estimating water heating requirements for various installations. Details controls, safety devices. *The Cleveland Heater Co.*

Turn the page

OTHER CATALOGS
Materials ..... p. 214
Instruments and Controls ..... p. 214
Plant Sites ..... p. 216
Production ..... p. 216
Building Equipment ..... p. 218
Valves, Pipes and Fittings ..... p. 220
Materials Handling ..... p. 220
Miscellaneous ..... p. 222

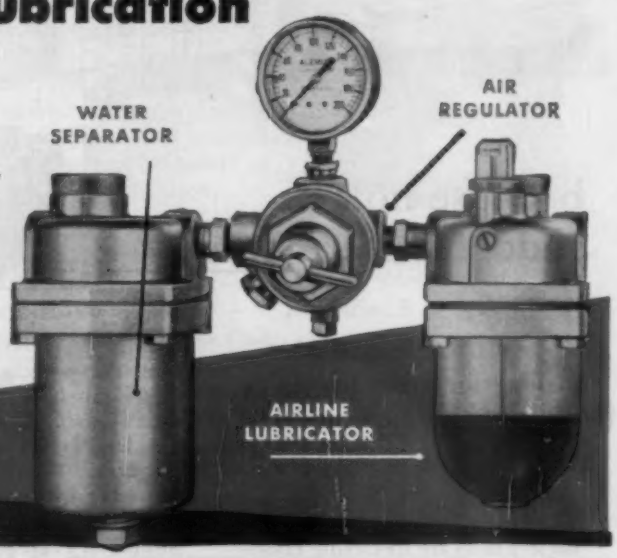
Alemite "Tri-Duty" air line controls!

All-New...for the cleanest, driest, best-regulated air line lubrication

Automatic Water Separator! Removes all of condensate, all the time. Traps dirt particles to prevent damage to sensitive air line devices. Handles all air line pressure up to 200 PSI and flow volume from 5 to 50 CFM.

Air Regulator with Gauge! Assures accurately controlled air—prevents erratic operation and damage to equipment. Adjusts to any pressure up to 200 PSI.

Automatic Air Line Lubricator! Provides automatic lubrication to air-operated mechanisms. Air stream controlled by compensating Venturi valve. Nine-ounce capacity.



All-New features offer outstanding advantages:

1. Single Unit Control Lubricator. Regulates the exact oil output required.

2. Visual Oil Counter. Oil sight dome in lubricator permits visual observation and count "per-drop" of lubrication.

3. Uniform Oil Mixture. Regardless of air pressure and volume!

4. Consistent Output. Oil and air mixture proportionately constant.

5. Easily Installed. Straight "inline" pipe connections . . . ½" p.t. inlet and outlet ports.

6. Wide Oil Range. Handles all viscosities of oil up to 500 SSU at 100° F.

7. Continuous Operation. Oil reservoir is refillable while unit is in operation.

8. Instant Oil Feed. For intermittent or continuous tool operation—no lag!

9. Filter Oil Tube. Removes all contamination from oil passing into air line.

10. Concentric Venturi Design. Assures constant, uniform mixture of air and oil.

11. Contamination-Free Air. Removable strainer in Air Regulator traps minute dirt particles.

12. Effective Control of Air Flow. Air Regulator eliminates excessive pressures and sudden surges.

13. 100% Condensate Removal. Water Separator removes and automatically dumps 100% of the condensate present in air lines.

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Please send me all the facts about Alemite's new "Tri-Duty" Air Line Controls.

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No scheduling problems here...

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Today's battle against production costs leaves no room for materials-handling stoppages

That's why so many cost-conscious battery users are specifying EDISON batteries and the economical EDISON automatic charge control. They've found EDISON batteries with the new active material offer two-way savings: full-shift availability *and* longer life than ever before. User experience and years of testing *prove* EDISON batteries with this new material can take the abuses that knock out ordinary batteries. And—for top economy—the new job-proved EDISON automatic charge control now offers set-it-and-forget-it protection against excessive overcharge.

For information on new materials-handling economy and performance—whether you favor leasing or purchase—see your EDISON man or write Edison Storage Battery Division, Thomas A. Edison Industries, West Orange, N. J. In Canada: International Equipment Co., Ltd., 90 Bates Road, Montreal, P. Q.

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EDISON Nickel-Iron-Alkaline STORAGE BATTERY
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Celebrating 50 years of progress, production, and continuing research . . . a background that brings you the world's longest lived, most dependable storage battery—the battery that's built with tomorrow in mind.

Edison NICKEL—IRON —ALKALINE Storage Batteries

. . . a product of Thomas A. Edison Industries of McGRAW EDISON

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS

27—Stainless Steel. Booklet SS-11 is a revised 40-pager on the use of stainless steel. Includes special sections for various industries, technical tables, details on the "stainless family," photos. *Allegheny Ludlum Steel Corp.*

28—Chain. Bulletin No. 22B8565A, 8-pager, describes improved "Thermopruf" chain for use in wet process cement, lime sludge kilns, etc. In ready-to-install lengths. Gives info on proof coil, other data. *Allis-Chalmers Mfg. Co.*

29—Ductile Iron Castings. Here's a 6-page booklet that tells why ductile iron is ductile. Also points out the properties that enable castings to resist deterioration from heat and atmospheric corrosion. *Crompton & Knowles Corp.*

30—Metal-Ceramics. Physical, mechanical, chemical properties, and applications of these new cermets are covered in 12-page catalog (F30,115). Contains grinding wheel dimensions, machining guide table, photos. *Haynes Stellite Co.*

31—Wrought Iron. "4-D Wrought Iron, A New Dimension in Corrosion Control" is an 8-pager (AIA. File No. 15-D). Shows comparative corrosion resistance of 4-D, standard wrought iron, and other ferrous metals. *A. M. Byers Co.*

32—Silicones. Two catalogs contain info on silicone fluids and insulating components. Form 3-112 (8-pages) is a guide to fluids for various applications; Form 10-109 (6 pages) covers uses for components. *Dow Corning Corp.*

INSTRUMENTS AND CONTROLS

33—Speed Measuring Instruments. Hand and fixed types and ranges of measuring instruments for applications in all industries are presented in Bulletin No. 35 (20 pages). Includes descriptive index, specs, photos. *James G. Biddle Co.*

34—Exciters, Calibrators. Illustrated 8-pager (No. 420E) covers products to excite, measure, and control vibration. Applications, specs, performance table, other info. *MB Mfg. Co.*

35—Temperature Indicating Controller. Here's a 4-page brochure (MC-168) that describes the simple design of the "541" controller and its advantages in installation, maintenance, etc. *Fenwal Inc.*

36—Temperature Detectors. Catalog No. EN-S4 (36 pages) illustrates and describes resistance thermometers for tem-

Built "UP TO A STANDARD"... not "DOWN TO A PRICE"

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26 pages of informative data and complete information on many Euclid Cranes depict how our cranes will benefit your material handling, manufacturing and assembling operations.

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HIGHEST QUALITY • RELIABLE PERFORMANCE • MINIMUM MAINTENANCE

An investment in a Euclid Crane pays off many times in reliable, trouble-free service for an unusually long period of time.

Standard models in a wide range of capacities, styles and spans generally meet average requirements.

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CAPACITIES TO 10 TONS

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Open plugged drains and supply lines *FASTER, BETTER*

with a KOLLMANN K-500

● Designed for industrial use, the K-500 makes fast work of stubborn flow line stoppages, eliminates trouble and "down time"... and anyone in the maintenance crew can operate it. The dolly-mounted K-500 handles up to 200′ of sectional cable (400′ with larger power units) for full-diameter cleaning of lines 3″ to 10″. Interchangeable clutch jaws quickly adapt it to lines as small as 1¼″. *Every* maintenance department can readily justify this machine ... it will pay for itself many times over.

See the full Kollmann line at your distributor, or write for literature

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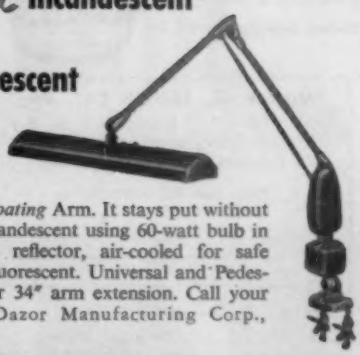
DAZOR FLOATING LAMPS

Fit the Lighting to Each User and Each Job

Top-Mounted Reflector

Side-Mounted

Air-Cooled **Incandescent or Fluorescent**



People ... jobs ... lighting needs differ. Let each employee control light location with the Dazor *Floating* Arm. It stays put without locking. Choice of Incandescent using 60-watt bulb in top- or side-mounted reflector, air-cooled for safe handling; or 2-tube Fluorescent. Universal and Pedestal models with 24″ or 34″ arm extension. Call your Dazor distributor. Dazor Manufacturing Corp., St. Louis 10, Mo.

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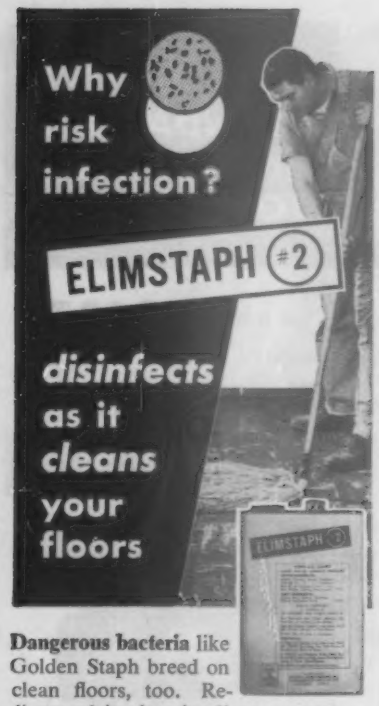

Dangerous bacteria like Golden Staph breed on clean floors, too. Redispersed in the air, disease germs can strike *anyone, any time.*

Play it safe. Specify ELIMSTAPH #2 as your daily cleaner. Its phenol coefficient of 33 (certified by U. S. Testing Co.) is 3 to 6 times more powerful than most germicides. Penetrates the wall, disintegrates the entire germ cell from within. *Residual,* it retains killing efficiency as long as it remains on the floor.

Saves you money. You use only one ounce per gallon of water. Cuts labor, too. Does a superb cleaning job, disinfects and deodorizes in one application.

Besides floors, apply ELIMSTAPH #2 on walls, doors, furniture, toilets, showers. Use it to disinfect garbage cans, mops, pails, brushes. Don't wait. Mail the coupon for full data on this amazing product.

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FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

peratures to 1000 F.; also assemblies, parts, accessories. Lists specs by application and design. *Leeds & Northrup Co.*

37—Crane Control. Two illustrated 8-pagers describe d-c and a-c control systems: No. 6100 tells about circuit d-c hoist controller applications; No. 6400 includes info on hook speeds. Curve charts, other technical data. *Square D Co.*

38—Leak Detectors. Data on four types of detectors and accessory equipment are presented in this 12-pager (GEA-6817). Describes how detectors locate leaks in any system or component under pressure or vacuum. *General Electric Co.*

PLANT SITES

39—Pacific Northwest. Illustrated brochure says the Puget Sound is a region for manufacturing and marketing expansion opportunities. Area includes Washington, Oregon, Idaho, Western Montana. *Puget Sound Power & Light Co.*

40—Florida. Historic, geographic, technological, economic features are covered in 18 pages of text and statistics. Tells of trend of nationally known companies to establish plants in Florida. *Florida State Chamber of Commerce.*

41—Greenville, Pa. This 24-page illustrated booklet presents facts about population, education, transportation, climate, financial facilities, etc. Maps show highways and railroads serving area. *Greenville Business Men's Assn.*

42—New Orleans. How and why this city is growing, and its sound economic development, is described in 36-pager. "America's Gateway to the World—the Port of New Orleans" is given as important asset. *Greater New Orleans, Inc.*

PRODUCTION

43—Arc Welder. Combination a-c, d-c, and inert-gas welding machine is described in an 8-page folder (DM71). Lists advantages of this 3-in-1 welder. Photos and diagrams. *Hobart Bros. Co.*

44—Set-Screw Driver. Here's an illustrated 4-pager (Form 2302) that presents advantages of this automatic device that feeds, inserts, tightens socket set screws. Gives over-all dimensions, specs, other info. *Standard Pressed Steel Co.*

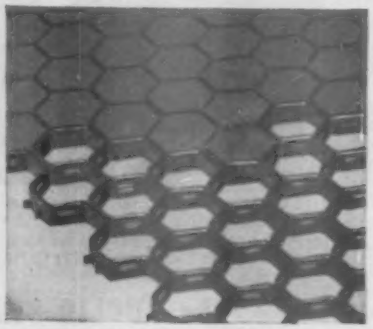
45—Tramp Iron Separator. Bulletin No. 1051 is an 8-pager that illustrates and describes the Indox V ceramic magnet drum separator. Has info on three models, photos. *Stearns Magnetic Products.*

Turn the page

"GRIDSTEEL" Pays for itself!

...You save two ways with
IRVICO "Gridsteel"

1. Initial low cost
2. Reduction of floor maintenance costs



"Gridsteel" protects floors from the damage normally caused by impact, skidding, vibration and heavy traffic. "Gridsteel" is made of steel bars on edge, joined together in a honeycomb mesh pattern. No potholes or ruts can form because any crack in the fill cannot spread beyond a single steel mesh.

"GRIDSTEEL" will protect floors made of wood, concrete, or asphalt.

Write today for complete information
Ask for 20-page color catalog on "Gridsteel" Floor Armor

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"A Fitting Grating for Every Purpose"

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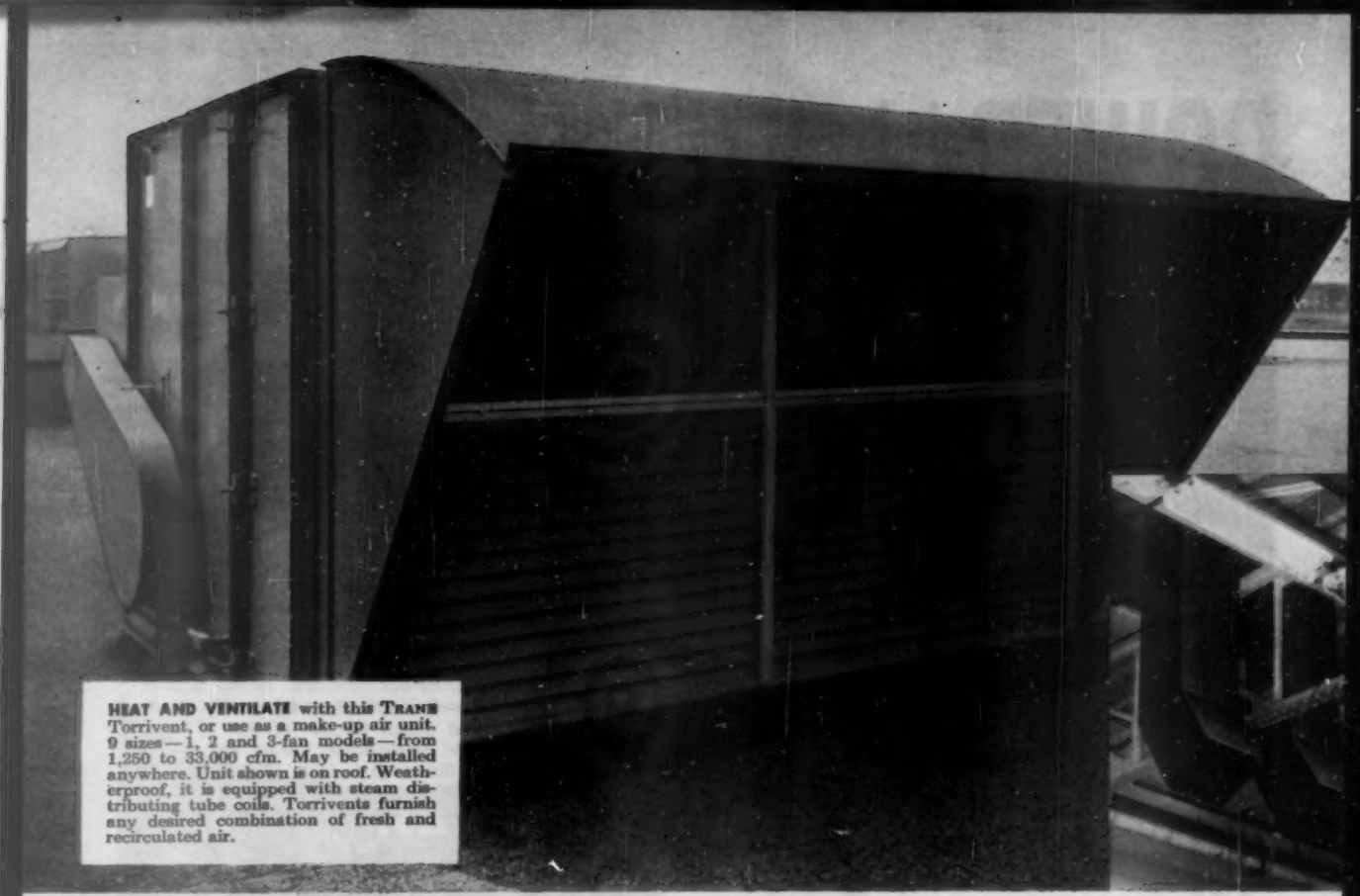


HEAT AND VENTILATE with this TRANE Torrivent, or use as a make-up air unit. 9 sizes—1, 2 and 3-fan models—from 1,250 to 33,000 cfm. May be installed anywhere. Unit shown is on roof. Weatherproof, it is equipped with steam distributing tube coils. Torrivents furnish any desired combination of fresh and recirculated air.

Stop cold air infiltration in plants quickly, simply with a Trane Torrivent!

Rugged, big-volume heating-ventilating units supply make-up air to equalize exhaust-system loss

Here's how to solve the problem of discomfort conditions caused by adding exhaust equipment to plant heating-ventilating systems. When drafts, uneven heating result from cold air infiltrating around doors and windows, use rugged, high-volume TRANE Torrivent units to supply make-up air, create a positive instead of a negative pressure within the building.

The TRANE Torrivent both heats *and* ventilates. It delivers a large volume of air—fresh or recirculated—heated to uniform temperatures and delivered at uniform velocities. The Torrivent is widely used for curing and drying processes, too. And its exceptionally quiet operation makes it especially suitable for schools, institutions and auditoriums where a high noise level would be objectionable.

Guard against cold air infiltration the next time you plan a job—or correct this condition when it occurs—by incorporating a TRANE Torrivent into the heating-ventilating system. The Torrivent will offset exhaust-system heat loss, provide uniform comfort with lower fuel costs.

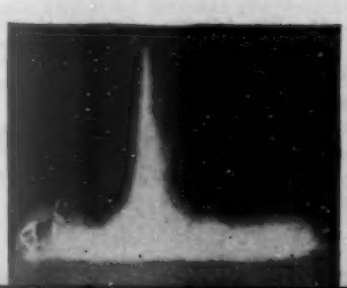
WANT MORE FACTS? For complete information on the Torrivent and other heating-ventilating equipment, call your nearby TRANE Sales Office. Or write TRANE, La Crosse, Wisconsin.

For any air condition, turn to

TRANE

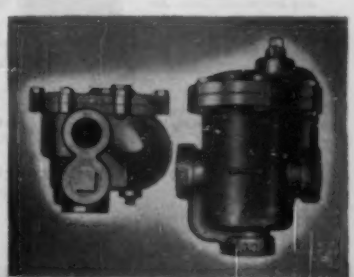
MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED TORONTO • 97 U.S. AND 10 CANADIAN OFFICES



Any Heating Pattern is possible with this TRANE Projection Unit Heater! Exclusive diffusion features provide an almost unlimited number of heating patterns. Projection and Horizontal types available for any application.

Matched Equipment for *all* heating, ventilating equipment! The new, redesigned line of TRANE Steam Specialties saves fuel, gives you *matched* equipment for every job. Traps, strainers, valves, vents for any type of system.



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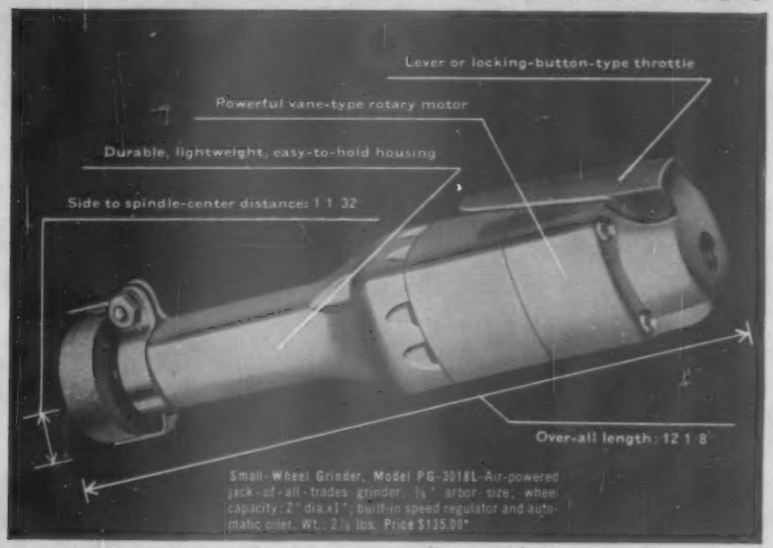
POWER to boost job efficiency with REMINGTON tools


Lever or locking-button-type throttle
Powerful vane-type rotary motor
Durable, lightweight, easy-to-hold housing
Side to spindle-center distance: 1 1 32
Over-all length: 12 1 8
Small-Wheel Grinder, Model PG-3018L-Air-powered jack-of-all-trades grinder. ¼" arbor size; wheel capacity: 2" dia.x1"; built-in speed regulator and automatic oiler. Wt.: 2¼ lbs. Price $135.00*

Drill, Model 381—⅜" capacity; compact; 2.5, 115-volt motor; free speed: 800 amp; full ball-bearing, construction and precision-cut gears. **Price $59.00***

Flexible-Shaft Machine, Model 8FGP—3-hp, totally enclosed dust- and vapor-proof induction motor geared for 4,500 rpm; 220/440 volts; sealed ball bearings. **Price $370.00***

Circular Saw, Model 106—10" blade; super-duty, super-torque worm drive; 13-amp. motor; 3,500 rpm; rugged, lightweight; 20 lbs. **Price $195.00***

Remington delivers power, mobility and easy handling to help you cut costly man-hours on the tough jobs. Remington Power Tools are designed and built for extra-long service with minimum maintenance. Your Remington distributor stocks and services the industry's widest selection of power tools and parts.

Sander, Model 57S—7" discs, quick-change spindle lock; free speed 4,500 rpm; heavy-duty ball bearings; 10 amps; wt.: 14 lbs. **Price $88.00***

Mechanics Maintenance Kit, Model MM-43—Air-powered (Model MM-40: electric-powered) impact wrench with multi-purpose accessories. **Price $395.50***

CHOOSE THE POWER MOST EFFICIENT FOR YOU. REMINGTON POWER TOOLS ARE AVAILABLE IN **AIR • ELECTRIC • GASOLINE-DRIVEN MODELS**

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Send for free catalog describing the complete line of Remington Contractor and Industrial Tools. Also available: folder describing Mechanics Maintenance Kits with examples of savings. Mail the coupon.

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FACTORY / CATALOG NEWS

Begins on page 212

For more about these items, circle item numbers on Reader Service Card next to back cover.

46—Electrostatic Spray Equipment. How to eliminate bottlenecks in finishing departments is explained in 6-page booklet. Includes photos of ionic guns and centrifugal atomizer systems for many applications. *Ionic Electrostatic Corp.*

47—Production Control. This 6-pager discusses the many things production control can mean to many people. Company's system includes use of Keysort cards in making accurate studies of production and cost control. *The McBee Co.*

48—Flexible Automation. "Planning for Flexible Automation" (GED-3684) is an 8-pager. Defines the use of numerically controlled machines, gives case histories, tells how to decide need for automation. *General Electric Co.*

49—Eccentric Geared Presses. Operating and design features of line of straight side, single-action presses are discussed in illustrated 44-pager (No. 66A). Gives factors governing press speeds, etc. *Niagara Machine & Tool Works.*

50—Special Tools. Here's a 48-page catalog (No. 571) that covers rotary slitting and trimming knives, cut-off knives, chopper blades, milling cutters, grooving, and other metal-working tools. Many illustrations. *Cowles Tool Co.*

BUILDING EQUIPMENT

51—Doors, Frames, Hardware. Catalog No. 1040-F (28 pages) describes door-frame-hardware "package"—with units engineered to complement each other. Info on metal, jalousie, and louver doors, other products. *Ceco Steel Products Corp.*

52—Refractory Linings. Monolithic linings for protection of stacks and breechings are described in this 8-pager (Form 75). Gives characteristics of five grades of castable refractories. *Plibrico Co.*

53—Watertight Masonry. This foldout 6-pager ("O.M."-8A) outlines six important features in the design of watertight masonry walls. Covers selection and proportioning of ingredients, types of mortar, etc. *The Master Builders Co.*

54—"Pyrojector." Automatic heat, smoke, and explosion relief unit is explained in illustrated booklet (Form No. PJ-1). Unit opens when fire or explosion occurs, and smoke, heat, explosive force go through roof. *The Swartwout Co.*

55—Tile Adhesive. Catalog (4 pages) lists performance data and properties of CTA-50, a water-dispersed ceramic tile adhesive. Shows application for setting wall tile. *Minnesota Mining & Mfg. Co.*

Turn the page

low maintenance cost

It costs you next to nothing to maintain your heating system when you have Reznor gas heaters. A few minutes per heater once a year for motor lubrication should be your total maintenance time. And no skilled labor is required. Heater failures? Simple, fool-proof design and quality construction make them a rarity.

LOW MAINTENANCE COST is just one of many reasons why Reznor gas unit heaters are right for so many plant heating jobs. Whether you need one heater to eliminate a "trouble" spot or enough units for a complete plant heating system, ask your Reznor distributor for details or write for your free copy of "Modern Heating".

Look for Reznor under "Heaters-Unit" in the Yellow Pages

REZNOR
WORLD'S LARGEST SELLING DIRECT-FIRED
UNIT HEATERS

Reznor Manufacturing Company, 89 Union Street, Mercer, Pa.

For more facts circle 595 on Reader Service Card

MR. INDUSTRIALIST

Consider GREENVILLE, PENNA.

If it's a **NEW PLANT SITE** you need—in the **Heart of Industrial America**

Do You Require	Yes	No
Location midway between Pittsburgh Cleveland, Erie	☐	☐
Service of four major railroads	☐	☐
Unlimited electric power and unlimited natural gas	☐	☐
Municipal-type water supply, sewage disposal facilities	☐	☐
Excellent local and area recreation opportunities	☐	☐
Ideal home sites	☐	☐
Good schools (two new high schools opening soon)	☐	☐
Local liberal arts college	☐	☐

All YES score indicates you should write for Free Booklet and further Information to:

REYNOLDS DEVELOPMENT
ROBERT B. PARKER, JR.
Managing Engineer
P. O. Box 606, Greenville, Pa.

For more facts circle 596 on Reader Service Card

Eliminate expensive "slips" with

ALCOA ABRASIVE TREAD PLATE

An employee slips on greasy metal flooring, injures his back. Medical costs run up to $523.77. Workmen's Compensation is $1,313.30. Additional claims may be as much as $2,000 more. The employer's accident rate is up and production is down while another worker is trained.

This is just one of the 20,000 expensive slipping accidents which kill or injure industrial workers each year. Most of them can be prevented. Alcoa® Aluminum Abrasive Tread Plate remains slip-proof even when wet, oily or greasy. Made of tough particles of fused aluminum oxide, its hard, abrasive surface is the only nonskid floor plate that gives you the advantages of lightweight, corrosion-resistant aluminum.

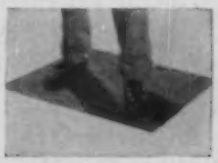
For more information on how you can eliminate hazardous conditions from floors, stairs, ramps and other areas, check the coupon below; write Aluminum Company of America, 1667-K Alcoa Building, Pittsburgh 19, Pa., or call your nearest Alcoa distributor.

Make Your Own 30-Second Safety Test . . . Send the Coupon for FREE Sample of Alcoa Abrasive Tread Plate.

ALCOA ALUMINUM

Your Guide to the Best in Aluminum Value

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings



Sure-grip Alcoa Abrasive Tread Plate is the best insurance you can buy against slipping accidents.

Aluminum Company of America
1667-K Alcoa Building, Pittsburgh 19, Pa.

I'd like to see how Alcoa Abrasive Tread Plate prevents slipping. Please send me FREE sample—also application, design and fabricating data.

Name and Title.....

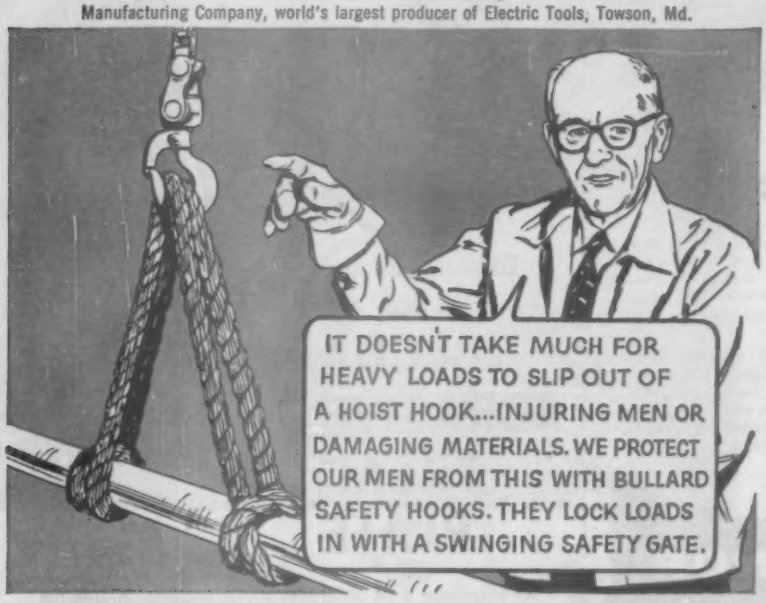
Address.....

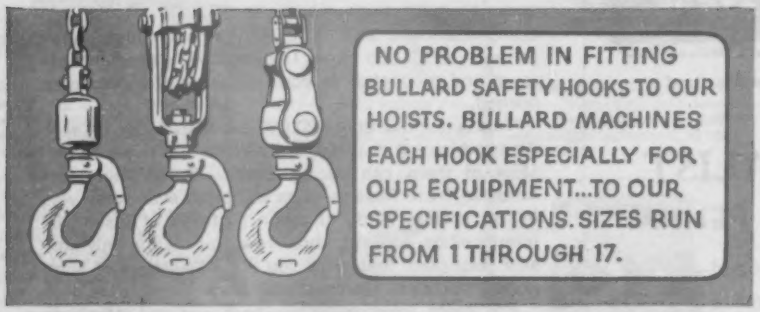
City and State.....

For more facts circle 597 on Reader Service Card

WHEREVER WE HAVE HOISTS.... WE HAVE MECHANICAL SAFETY INSURANCE!

. . . says Charles S. Smickle, Safety and Health Manager of the Black & Decker Manufacturing Company, world's largest producer of Electric Tools, Towson, Md.


IT DOESN'T TAKE MUCH FOR HEAVY LOADS TO SLIP OUT OF A HOIST HOOK...INJURING MEN OR DAMAGING MATERIALS. WE PROTECT OUR MEN FROM THIS WITH BULLARD SAFETY HOOKS. THEY LOCK LOADS IN WITH A SWINGING SAFETY GATE.


NO PROBLEM IN FITTING BULLARD SAFETY HOOKS TO OUR HOISTS. BULLARD MACHINES EACH HOOK ESPECIALLY FOR OUR EQUIPMENT...TO OUR SPECIFICATIONS. SIZES RUN FROM 1 THROUGH 17.

SAFETY GATES ACT AS DANGER GAUGES, TOO. IF A HOOK IS SPRUNG ONLY 1/8" WE CAN SEE THE HOOK IS WEAKENED AND POTENTIALLY DANGEROUS.

Swing closed, gate automatically locks. Push non-jamming release button, hook snaps open.

Write for safety hook data sheet.

E. D. Bullard Company
Sausalito, California

BULLARD
INDUSTRIAL SAFETY EQUIPMENT

FACTORY / CATALOG NEWS

Begins on page 212

For more about these items, circle item numbers on Reader Service Card next to back cover.

VALVES, PIPES AND FITTINGS

56—Steel Valves. Catalog No. 14 (92 pages) describes cast and forged steel pipes. Visual indexes show valves grouped according to types, functions performed. Includes formulas, curves, and other data; photos. *Edward Valves, Inc.*

57—Flexpipe. Bronze, stainless steel, and hot-dipped galvanized steel Flexpipe and assemblies are discussed in this 6-pager, Bulletin No. FP-4. Gives installation suggestions, specs, applications, photos. *The American Brass Co.*

58—Pipe Fittings, Valves. Bulletin No. PF1300 is an 8-pager with details about natural hard rubber and Buna-N synthetic rubber for pipe fittings and valves. Includes diagrams, dimensions of threaded fittings. *Luzerne Rubber Co.*

59—Regulator, Valve. Two bulletins: No. 1044 (4 pages) on Type BI feedwater regulator—single element unit for boilers operating at pressures from 10 to 785 psig.; No. 1052 (2 pages) on Type 3-S-2 differential valve. *Blaw-Knox Co.*

60—Mechanical Tubing. Illustrated 6-pager (TB-418) explains how production can be simplified by selection of right type of tube. Tolerance tables for cold drawn and hot finished seamless carbon steel tubing. *The Babcock & Wilcox Co.*

MATERIALS HANDLING

61—Self-Dumping Hopper. This 4-page bulletin (No. 260), and a small fold-out booklet, describe a hopper for low-cost handling of wet or dry, hot or cold, bulk materials. Diagrams and photos show applications. *Roura Iron Works, Inc.*

62—Conveyors. Catalog No. 5 (72 pages, illustrated) has data covering many types of conveyors and special materials handling equipment. These include trolley, roller, slat, belt, and special systems, attachments. *Conveyor Systems, Inc.*

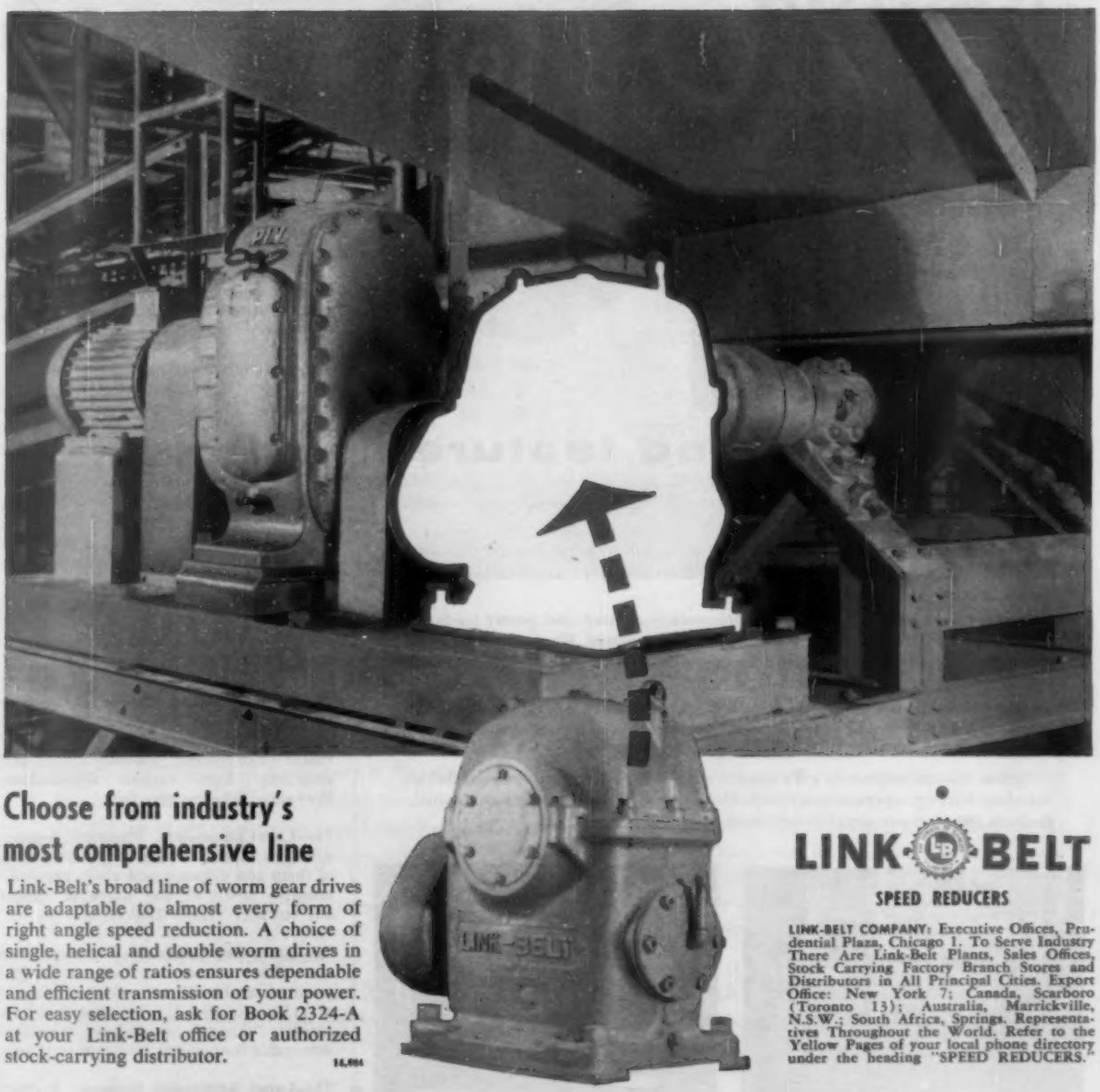
63—Fork Lift Trucks. Here's an illustrated 12-page catalog to introduce a new line of electric, gasoline, and diesel lift trucks that are manufactured in Europe. Includes specs, performance curves, photos. *OM Lift Co. of America, Inc.*

64—Conveyors, Belting. Four booklets: MF-100 (8 pages) and MF-600 (6 pages) on hinged-steel belting for handling heavy, hot, rough materials; 2-pager on flush-with-floor belting installations; MF-200 (4 pages) on components. Photos. *May-Fran Engineering, Inc.*

Turn the page

If it's high-ratio speed reduction in limited space... it's a

spot for a LINK-BELT Worm Gear Drive



Choose from industry's most comprehensive line

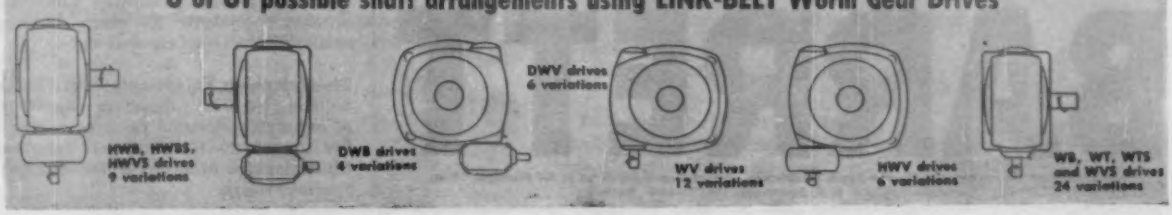
Link-Belt's broad line of worm gear drives are adaptable to almost every form of right angle speed reduction. A choice of single, helical and double worm drives in a wide range of ratios ensures dependable and efficient transmission of your power. For easy selection, ask for Book 2324-A at your Link-Belt office or authorized stock-carrying distributor. 14,804

LINK-BELT

SPEED REDUCERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. Refer to the Yellow Pages of your local phone directory under the heading "SPEED REDUCERS."

6 of 61 possible shaft arrangements using LINK-BELT Worm Gear Drives


HWB, HWBS, HWVS drives 9 variations
DWB drives 4 variations
DWV drives 6 variations
WV drives 12 variations
HWV drives 6 variations
WB, WT, WTS and WVS drives 24 variations

NEW TRACTOR

WITH

first-of-its-kind features

New and different? Look at this new Barrett Tractorox. See its ahead-of-the-rest advantages:

Smoother power—radically new gear drive, revolves in constant oil bath. Adjustable time-delay mechanism means smooth power acceleration. High torque motor.

Greater efficiency (and less maintenance)—control and power leads do not move. Gear drive is single-piece unit, easily removed. Motor, transmission and drive wheel in balanced vertical column. Simple mechanisms throughout, easily accessible.

New conveniences—on-the-handle dual controls. Acceleration and braking unitized to prevent simultaneous operation...reduces brake wear and motor overloads. Low 7-inch standing platform.

Again, Barrett engineers a Tractorox to *your* job. Three models available: Stand-up Riding: operatorless Guide-O-Matic® or Radox® remote-controlled. ***Bulletin 588 gives you complete information. Ask for it.***

One man does a two-man job with this remote-controlled Radox Model.

Guide-O-Matic equipped Tractorox engineered for automated materials handling.

BARRETT

Barrett-Cravens Company, 616 Dundee Road, Northbrook, Illinois. Representatives in All Principal Cities. Canadian Licensee, S. A. Armstrong, Ltd., Toronto, Canada.

FACTORY / CATALOG NEWS

Begins on page 212

For more about these items, circle item numbers on Reader Service Card next to back cover.

65—Casters, Trucks. This condensed catalog of 24 pages describes company's materials handling equipment. Includes info on variations of some 12,000 casters, dollies, platform and hand trucks, lift jack systems. *The Colson Corp.*

66—Vibrating Conveyors. Catalog No. 66 (16 pages) tells about materials handling operations that can be performed simultaneously while conveying. This selection guide has flow charts, etc. *Ajax Flexible Coupling Co., Inc.*

67—Roller Chains, Sprockets. Comprehensive book (No. 2657) has 154 pages of engineering data on these products. Describes use of roller chain for both power transmission and conveyor service, with chain illustrations. *Link-Belt Co.*

68—Materials Handling Equipment. Bulletin No. GC-58 (44 pages) presents on-the-job photos and descriptions of conveyors. Lists specs and accessory equipment; outlines principles of coordinated system. *The Rapids-Standard Co.*

69—Fork Lift Trucks. Useful features of GS-approved trucks in the 3000- to 10,000-lb. capacity ranges are explained in 4-pager (BU-481). Photos tell how these fire-protected trucks work in hazardous areas. *Allis-Chalmers Mfg. Co.*

MISCELLANEOUS

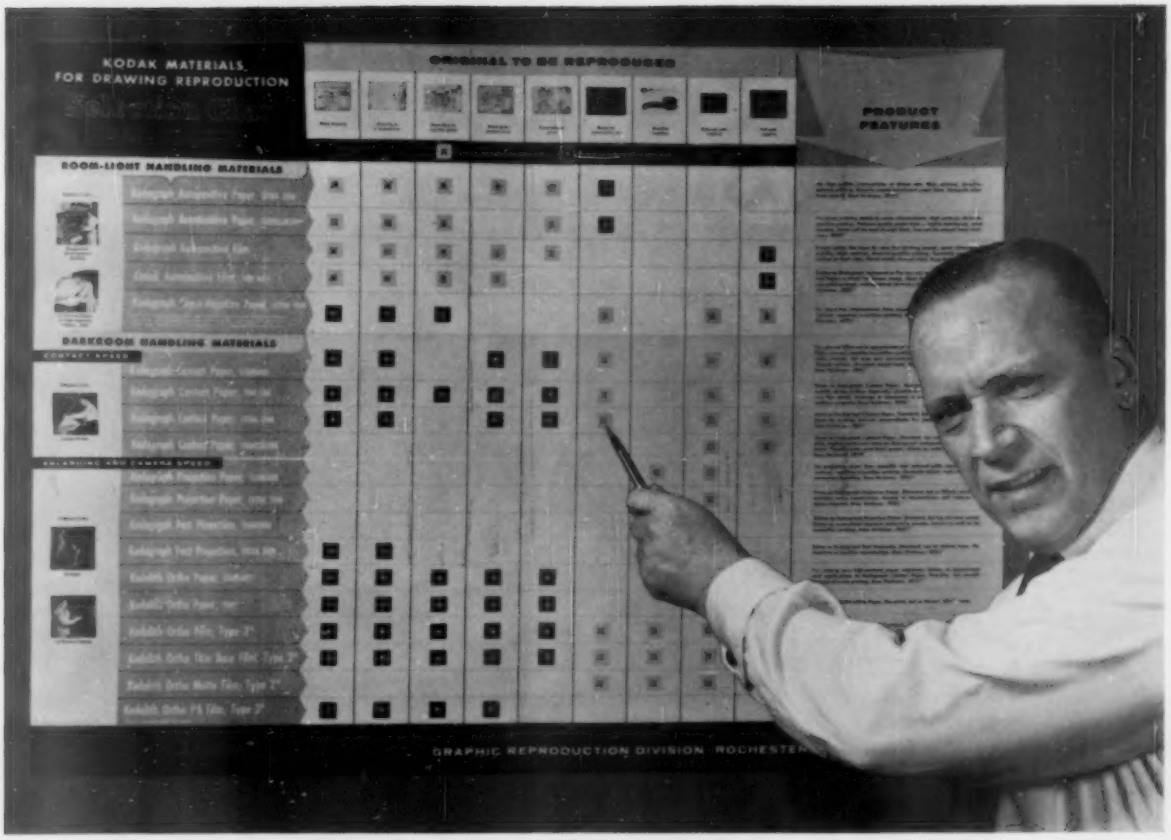
70—Data Processing System. This 6-page bulletin (No. 3017) provides info on the operation, construction, and features of maker's 210 System. Includes photos and diagrams. Lists various applications. *Beckman Instruments, Inc.*

71—Label Dispensers. Illustrated 6-pager describes tape and label dispensers. One of them can dispense and apply pressure-sensitive labels of any shape to almost any surface. *Derby Sealers, Inc.*

72—Electronic Computer. Programer can now direct a computer with words instead of mathematical symbols. Manual of 115 pages (No. U1518) describes how Univac "accepts" vocabulary, translates into coded instructions. *Sperry Rand Corp.*

73—Label Addressing Systems. Booklet No. A-124 is a 6-pager with illustrations and case histories on "How to Save Time and Money with 'Assembly Line' Addressing." Systems fill many marking needs. *Weber Marking Systems.*

74—Television Equipment. This 12-page bulletin (No. 2239) describes major types of industrial television equipment. Gives five suggestions for equipment selection. Illustrates case histories. *Diamond Power Specialty Corp.*



Quick guide to better printmaking

FREE... this handy wall chart lets you put your finger right on the Kodagraph Reproduction Material which will give desired results in reproducing all types of drawings or other originals in all types of printmaking equipment.

Whether you do your own printmaking or order from a local blueprinter, you will find this chart a big help in the drafting room.

It tells you, for example, which Kodagraph Materials give you sharp, clean intermediate prints of old soiled drawings; which ones are best for reproducing blueprints, microfilm negatives, drawings with extremely fine detail.

In addition, this chart (printed on durable plasticized paper) brings you up to date on all the materials in the versatile Kodagraph and Kodalith lines. Saves you thumbing through pages of data books for information. *Well worth sending for today!*

EASTMAN KODAK COMPANY
Graphic Reproduction Division, Rochester 4, N.Y.

Kodagraph Reproduction Materials

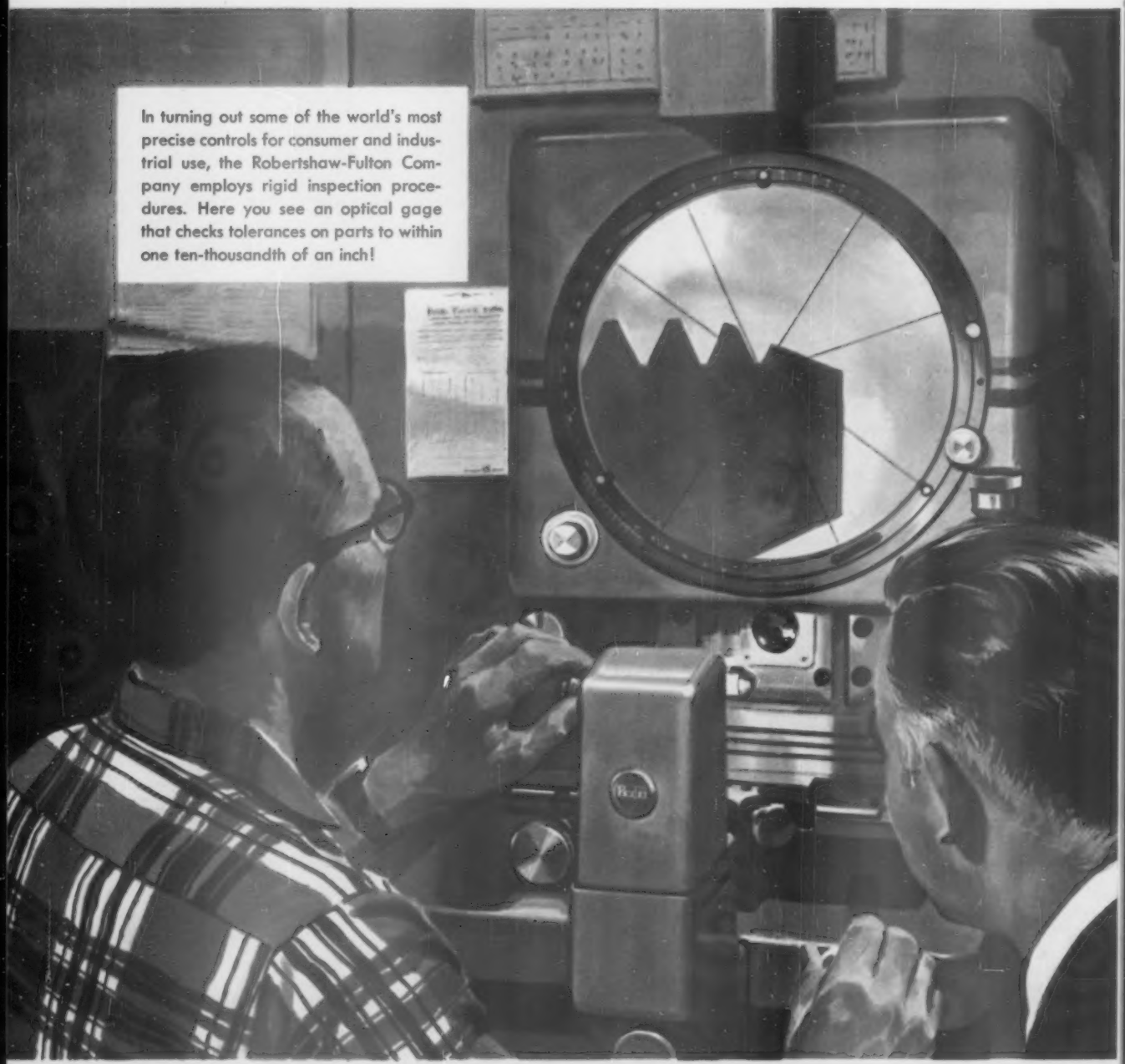
- **Kodagraph Autopositive Paper Extra Thin** for high-quality photographic intermediates at lowest cost.
- **Kodagraph Autopositive Paper Translucent** for faster printing, more durable, easier-to-revise intermediates.
- **Kodagraph Autopositive Film** for very fast-printing intermediates of highest quality.
- **Kodagraph Contact Paper Translucent** for fast-printing, durable, very high-quality intermediates.
- **Kodagraph Repro-Negative Paper** for black-line intermediates from negative-type originals.

Kodak
TRADE MARK

For more facts circle 601 on Reader Service Card **For more facts circle 602 on Reader Service Card**

Correct Lubrication in Action...

How precision teamwork


In turning out some of the world's most precise controls for consumer and industrial use, the Robertshaw-Fulton Company employs rigid inspection procedures. Here you see an optical gage that checks tolerances on parts to within one ten-thousandth of an inch!

Mobil

Complete Engineering Program
Proved Petroleum Products

Mobil

SOCONY MOBIL OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

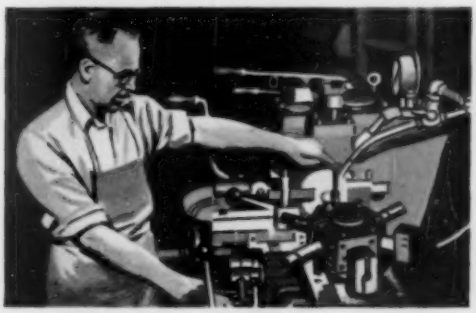
cut costs- saved $12,532

Here's how Robertshaw-Fulton Controls Company and Mobil cut maintenance costs in numerous ways!

"Miracles with metals!" That's the description for the precision controls produced by the Fulton Sylphon Division of Robertshaw-Fulton Controls Company in Knoxville, Tenn. To turn out these finely engineered products takes the utmost coordination between machines and men. Here's where *Mobil Correct Lubrication* comes in.

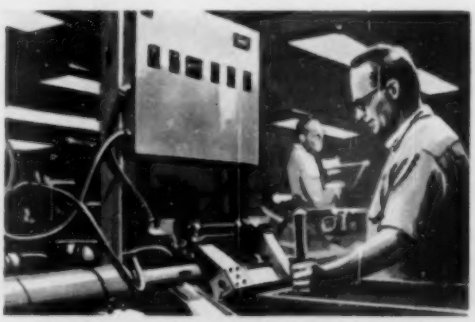
Mobil engineers and plant maintenance personnel work as a team to solve maintenance problems and keep production at a maximum. For example: Bearing failures on controlled atmosphere furnace caused occasional shutdowns. Mobil engineers and plant supervisors developed a special automatic lubricating system that solved extreme temperature problems. Result: *no more bearing replacements* . . . in a year, *$2,700 saved.*

Here is just one of many examples of *Correct Lubrication in Action.* Imaginative engineering . . . research . . . laboratories on call . . . more lubricating experience than any other oil company back up a Mobil Program in a plant. Why not specify Mobil for your plant?



Turret lathe heads weren't indexing properly at times, resulting in losses on machined parts. Lathe had to be serviced several times a week. Mobil and plant men pinpointed trouble in soluble oil emulsion. New formulation solved problem . . . saved $2,000 a year in repair costs alone.

Previously, it required stopping machinery while a man brushed lubricant from a 35-lb. pail onto gears. Now with new pressurized Mobilcote S dispenser application is quick . . . no interruption to production . . . consumption of gear lubricant cut 95%. And a more thorough job is done too!



The four-way pilot valves on twenty-six hydraulic Corrugating Machines "froze" after shutdown over weekend . . . had to be disassembled and cleaned each time. Mobil analysis found trouble to be corrosion. Mobil recommendation eliminated trouble . . . saved $2,072 per year.

The thirteen Redraw Presses were eating up oil. Mobil and plant men devised system that included mechanical improvements . . . tightened hydraulic system . . . installed collecting pans and used portable oil filter. Result: 9,600 gallons of oil reclaimed . . . $5,760 saved annually.

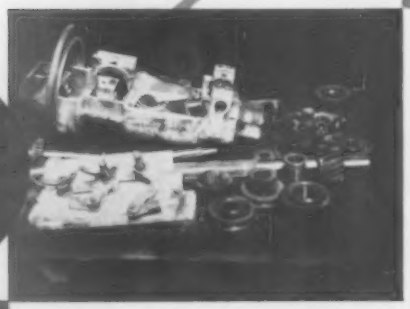
Correct Lubrication

Another reason You're Miles Ahead with Mobil!

BULLARD

rebuilds from the ground up

Yes — we disassemble each machine right down to the bed.

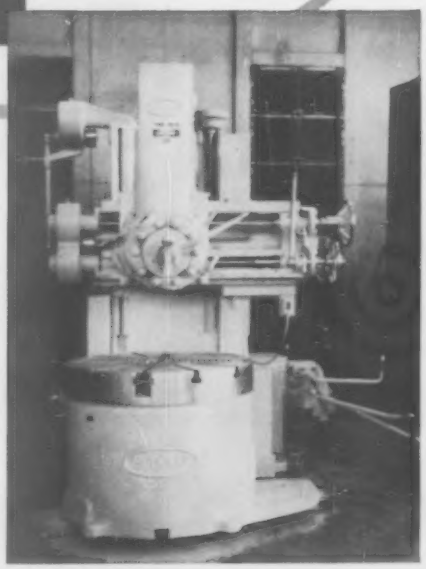


Each individual piece is cleaned and inspected

and if found serviceable is re-used, if not, it is replaced.

What does this mean to You?

1. Thorough workmanship by the same skilled craftsmen that built the machine.
2. Only "original equipment" precision replacement parts, where necessary.
3. Fast service.
4. One year guarantee on all parts replaced — including labor.



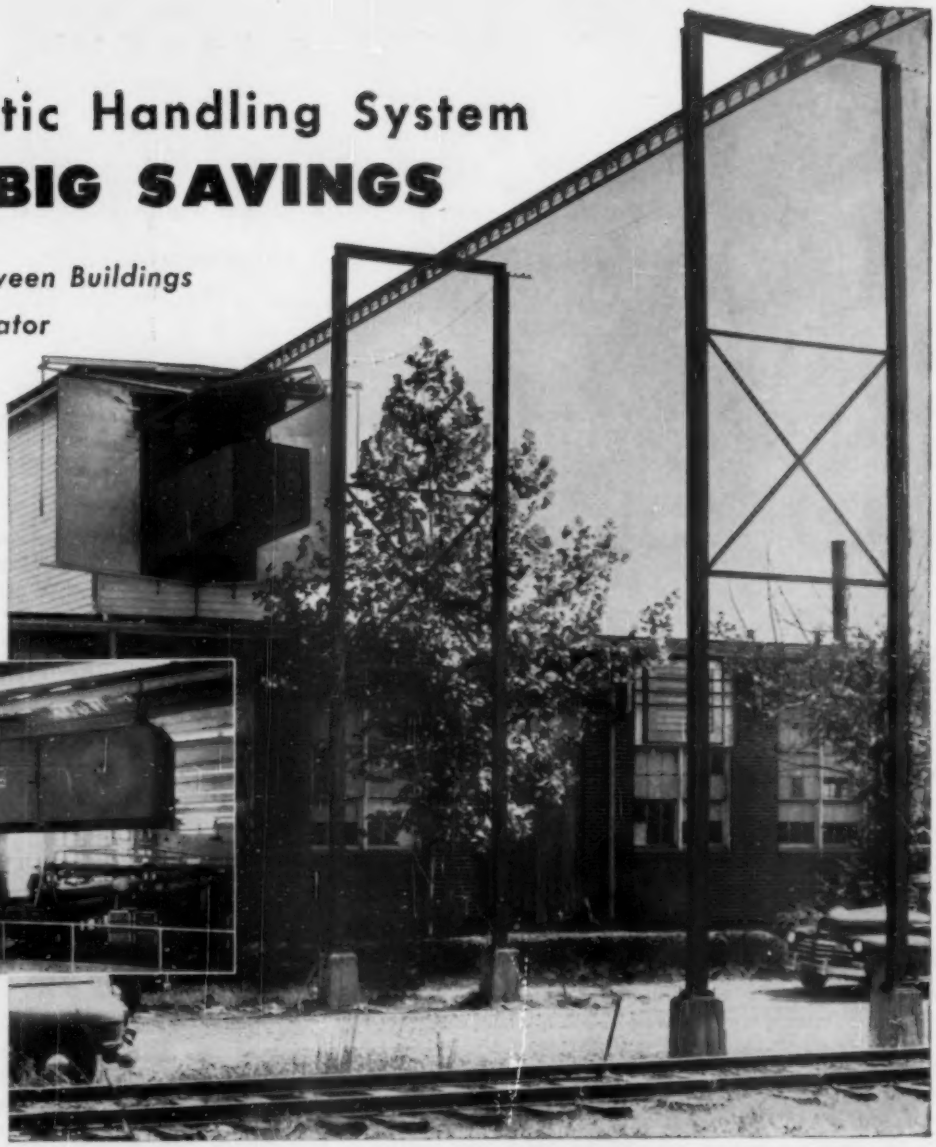
If you're planning to rebuild any of your Bullard machines contact your nearest Bullard Sales Office or Distributor for a quotation or write

BULLARD

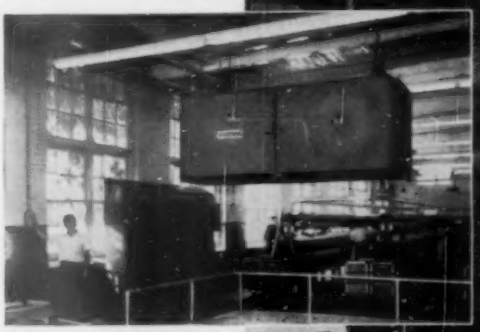
THE BULLARD COMPANY BRIDGEPORT 2, CONNECTICUT

Automatic Handling System Brings **BIG SAVINGS**

Operates Between Buildings Without Operator



A Tramrail freight-carrying van leaving one building. Building doors open and close automatically. Tramrail track is high and above interference with railroad. The entire handling system is very safe.



Operator pushes wall button to start van on its way. Van rises until it reaches Tramrail carrier on track. Then carrier hauls van to building selected.

RAIN or shine, this Cleveland Tramrail system works without complaint. Inclement weather is of no concern, because no one has to go outside to operate this system.

The Tramrail freight-carrying van travels between buildings as directed by the touch of a pushbutton. It goes up and down grades and handles materials between different floor levels.

No regular operator is needed for this type of system. Usually the time required to dispatch loads is so little that production workers can do this along with their normal duties.

Great savings are made with Cleveland Tramrail automatic handling systems. They cut handling time enormously. They operate overhead above usual floor traffic and hindrances. They save floor space. They eliminate expensive floor repairs which floor conveyances make necessary. Tramrail equipment requires far less maintenance than usually is necessary with other types of conveying equipment.

Because the dividends are large and immediate when you install a Cleveland Tramrail automatic handling system, it will be to your interest to get the facts on what Cleveland Tramrail engineers can do for you.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

Write for free "Automatic Handling" booklet.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3235 EAST 290 ST. • WICKLIFFE, OHIO

This plant-tested yardstick will gage performance of your key men on the whole job (not just part of it), pinpoint shortfalls and progress, steer them to steady improvement. It's a . . .

Sure Way to Measure Managers

YOU MEASURE a plant operating executive against what you expect him to do. Same way, in fact, that you measure a football coach (cartoons opposite). Your plant executives and the football coach function in their own special areas. The coach usually isn't expected to teach English literature to his squad. And your production managers aren't expected to purchase their own materials. It's not part of their job.

That's just about where the responsibilities of coach and plant executive stop being simple. The coach must win enough games to keep the alumni happy, make speeches to them, build a good team, keep the boys on the squad happy, and draw bigger crowds. Your managers, whatever their duties, have complex jobs to do. They need your help to know which are most important. And you need their cooperation to meet all the objectives higher management sets for you.

Here at General Electric Aircraft Gas Turbine Division (Components and Engine Rebuild Section), we've developed a system to rate 85% of our superintendents, general foremen, foremen, and planning supervisors. We've been revising our system for five years.

Today we see many benefits in our system:
. . . *We have a record* of performance that helps in discussions of salary, promotion, demotion.
. . . *We take the pulse* of our operation regularly.
. . . *The effect spreads,* because managers who are objectively and fairly measured tend to use the same system with their subordinates.

EIGHT YARDSTICKS USED

Our manager measuring system has eight major categories. The details of each vary, depending on the responsibilities of the man measured. Here are the categories—with some of the details that adapt them to measuring a manufacturing superintendent:

1. Profit—What are his costs of operating? Are they within prescribed limits?

By R. L. GRUNEWALD, Manager—Manufacturing, Gas Turbine Department; and G. E. McLAUGHLIN, Manager—Manufacturing Administration, Components and Engine Rebuild Section, Production Engine Department, General Electric Company, Evendale, Ohio

2. Productivity—Does he continually improve it?

3. Production schedules—Does he meet them?

4. Quality—Does he maintain high quality and minimize manufacturing losses?

5. Technological advances—Does he improve methods, processes, machines, procedures, etc.?

6. Personnel development—Is he developing the capabilities of the persons within his organization? Does he encourage his personnel to undertake additional training where practical and to participate in educational programs sponsored by the company? Does he provide assignments that stimulate his personnel and stretch their capabilities? How many people are being promoted within and out of his operation?

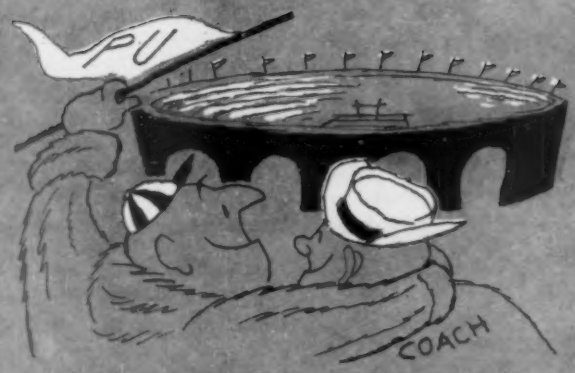
7. Employee relations—Does he have a good level of morale within his organization? Do his people operate as a team? Does he provide a means for airing difficulties among his people? Is a productive climate evident in his operation?

8. Balance between short- and long-range plans—What are his plans for the present and the future? Does he program them for timely completion? Does he do enough profitable short-range work to permit long-range expenditures? Does he regularly review status of his operations versus plans?

MORE DETAILS NEEDED

Breaking any job down into eight or ten elements (like those above) is not difficult, and the breakdowns will help you and your manager understand the scope of his job. But it takes more than additional definition of a job to establish practical objectives. It's easy to be fooled at this point—to think you've gone far enough. Why? Because you and your manager have worked together to explore his responsibilities in detail. You both feel you now have a better understanding of his responsibilities. So the tendency is to stop, assuming that you have a much better basis for operation than you ever had before.

You're right. You do have a better basis for operation than before. But you don't have a basis for evaluation of performance until you've agreed on (1) what measures you will use and (2) what your performance targets will be.



1. Establish performance areas

2. Set up specific objectives

Take, for example, just five of the measures from the complete list of eight (facing page). In detail, they are the major measures we use in evaluating the performance of our manufacturing superintendents (as distinguished from our planning supervisors, for example). You'll see that each of these measures is tied to responsibilities —and is subject to direct measurement.

. . . *Profit*. Cost of product, inventory balances, non-productive time, overhead expense, total cost reduction realized.

. . . *Productivity*. Planned direct-labor hours per piece, direct-labor variance (planned hours vs. actual).

. . . *Production schedules*. Schedule realization and total billing.

. . . *Quality*. Per cent of defective dimensions, scrap, rework, customer complaints.

. . . *Employee relations*. Employee morale and attitude, absenteeism, lost-time accidents, number of fires, plant housekeeping.

SETTING UP TARGETS

We sit down with each manager and establish a budget, or bogey, for each measure. We analyze past performance, note trends, and agree on a performance target for the coming year.

For example, suppose Manager Bill Smith's department has been operating with an average of 3% defective dimensions for the last year. Previous data show that the department has made steady progress in reducing the rate of defects by 0.01% per month. So we might decide to extend that performance in our bogey, expecting a drop of 0.12% in defective dimensions after a period of 12 months.

On the other hand, Bill might argue—and we might agree—that reducing the per cent of defects will get harder as his percentage gets lower. So we might get together and mutually agree on a measurable standard of performance. Perhaps our bogey would be a reduction to 2% defective after 12 months. Once we agree on our target, we make a chart of expected performance for the year. During the year the performance of Bill's department will be entered on the chart for comparison with the bogey.

Turn the page

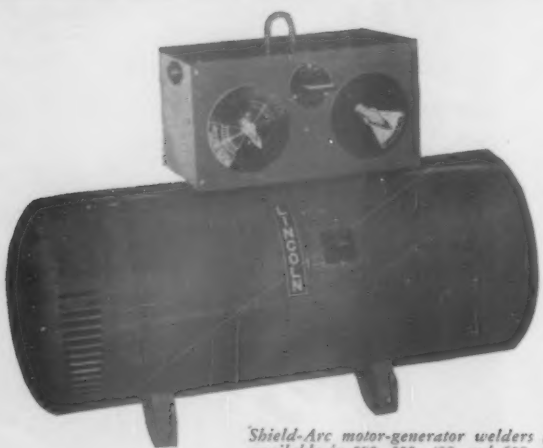
3. Study results in specific areas

4. Look at over-all performance

5. Act on your findings

Weldynamics

ARC WELDING AT WORK CUTTING COSTS



Shield-Arc motor-generator welders are available in 200, 300, 400 and 600 amp sizes; portable or stationary; for AC or DC power supply. Specifications and engineering data are contained in Bulletin SB-1362. Sent on request.

In Your Shop you can take advantage of Weldynamics by providing your weldors with the most efficient equipment.

Lincoln Shield-Arc Motor-Generator Welders are Weldynamically designed for fast, easy welding under any conditions.

Dual Continuous Controls allow the weldor to select the kind of arc he likes to work with. He uses the current control to select the welding heat, and the voltage control to select arc "snappiness" and to fine-tune the welding heat.

Nearly Every Weldor is familiar with Lincoln Shield-Arc Welders, and most weldors prefer them.

Lincoln Applies Weldynamics in its own plant to cut manufacturing costs. These savings are passed on to you in better welding products for less cost.

Lincoln Representatives are trained in Weldynamics. They are equipped to help you with procedures, equipment and design. A letter or phone call is all it takes.

The World's Largest Manufacturer of Arc Welding Equipment

LINCOLN

© 1958 The Lincoln Electric Company

THE LINCOLN ELECTRIC COMPANY • DEPT. 3725 • CLEVELAND 17, OHIO

These five measures of our manufacturing superintendent's efforts are direct, tangible. Even employee attitudes can be measured—by survey. But some of the eight job elements are not subject to exact measurement. For the manufacturing superintendent, this is true of three of his eight main responsibilities. Technological advances, personnel development, and balance between long- and short-range plans—all are subject more to judgment than to statistics.

Take new technological advances, for example. We review plans, set time and performance goals. But the bogeys are developed as the projects develop. We can't set a bogey based on experience, because the very nature of the activity precludes prior experience.

Same system holds for future planning. We get reports of long- and short-range plans from all managers, accumulate these in a single brochure. We use judgment rather than statistics to evaluate here.

Facts for measuring—Your next step is to set up routines for accumulating operating statistics you need to evaluate your managers. When we originally set up our program we found that minor changes were almost always required, but that many of the basic data needed for measurement were already being collected in some form. So, when we can, we use these data. If convenient, we measure monthly.

How often the data are summarized in the form of a report depends on these three things:

. . . *Relative importance* of any single measure considered in the light of all factors measured.

. . . *Cost of obtaining the measure.*

. . . *Cycle time involved* in accumulating statistics.

Take employee attitude, for example. We use a formal attitude survey to measure performance in this area. The survey takes weeks to make and analyze. And it's expensive. So we usually measure this performance annually. We measure more often only if we find an attitude problem in a department.

We update our bogeys every month. And the manager's performance earns him an F (favorable) or UF (unfavorable) for every element measured. Sounds a little like school grades. But here's where old-fashioned judgment gets back into the picture in a big way.

CHARTING BOGEYS

To make bogeys and performance graphic and impressive we use charts and curves. Suppose one of our managers consistently exceeded his bogey for overhead in January, February, and March. Reasons for his over-expenditure seemed reasonable under the circumstances. But we discussed his problem at the close of every month, developed plans to bring his performance into line, then agreed on a time period for bringing overhead into line. We drew this on the chart as an interim goal. Result: The manager's July performance is favorable (F) in our eyes in spite of the fact that it exceeds the original bogey. He met the interim goal—did a good job in our opinion.

The danger in this procedure, of course, is that you can be endorsing poor performance—stretching it out. Judgment, circumstances, and your sense of fair-

MISTKOP
STOPS MIST
COLLECTS MIST-FOG EFFECTIVELY IN A SMALLER SPACE
NON-ELECTRONIC!
This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*
Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights . . . eliminates fire hazards of uncontrolled mist. Write for detailed description.
AGET Manufacturing Company
1410 Church Street • Adrian, Michigan

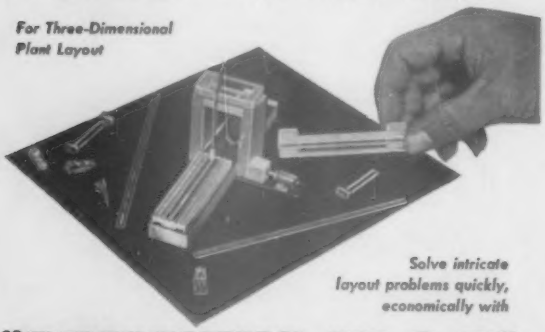
For more facts circle 609 on Reader Service Card

SUCCESSFUL EQUIPMENT GROUTING easy as 1-2-3
1. READY-TO-USE. Add only water to Embeco Pre-Mixed Grout, mix and place to produce a...
GROUT
WATER
2. . . . FLOWABLE easily-placed grout that hardens as a . . . .
3. . . . NON-SHRINK grout of high compressive and impact-resistant strength.
EMBECO PRE-MIXED GROUT
. . . Gives *lasting* results on every grouting job: heavy equipment, machinery, anchor bolts, building columns, bridge seats, etc.
Write for Free Grouting Guide.
DIVISION OF AMERICAN-MARIETTA COMPANY
the MASTER BUILDERS co.
CLEVELAND 3, OHIO
TORONTO 15, ONTARIO

For more facts circle 610 on Reader Service Card

NEW! MACHINE TOOL
ASSEMBLE-IT-YOURSELF KITS

For Three-Dimensional Plant Layout



Solve intricate layout problems quickly, economically with

"DESIGNING IN 3-D"

DO-IT-YOURSELF Three-Dimensional "Drafting"

Now Scott Industries brings you assemble-it-yourself machine tool kits scaled-to-size for more economical, more effective plant layout in three dimensions. Scott Industries offers you thousands of kits plus thousands of extra parts, such as pipe, fittings, motors, etc. which your own men can economically assemble to solve your plant layout problems. Scott Industries offers you the convenience and economy of one source of supply plus the services of *local* custom model making. Either way you save money.

Write for full information on "Designing in 3-D" and complete catalog of kits and parts.

SCOTT INDUSTRIES, INC.
Dept. FM10, Olean, N.Y.

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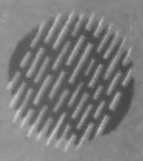
IN CHILLY BLASTS...



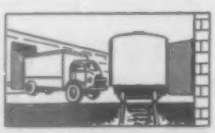
OR POURING RAIN...

is your LOADING DOCK inside... or outside?

There's a big difference . . . in fuel costs . . . in employee morale . . . in productivity of workers . . . in absenteeism due to colds or accidents . . . in protection of merchandise.

Only DAZZO Dock Shelters provide quick and full protection for dock operations in bad weather. Less than full protection is merely money wasted!

DAZZO Dock Shelters adjust themselves automatically to different dimensions of railroad cars or trucks. They expand in seconds by gravity, without use of springs. They retract out of the way when not in use.



Save *money* and *grief* . . . write for the facts about DAZZO Dock Shelters today!

DAZZO PRODUCTS, INC. 152 Bleecker St., N.Y., 12, N.Y. ORegon 3-5298

ness are your guides in stretching out or modifying an established bogey. Since you're working with many intangibles, fairness is a key need for success.

When budget and performance don't jibe, either one is wrong. We have a healthy amount of disrespect for our bogeys. We know they aren't infallible, so we temper our judgments with common sense. But that doesn't mean we're a soft touch for every sob story.

Time was when we measured only 50% of our superintendent's jobs. Now we feel we measure 90%. That's an example of the improvement in our system in five years. Much of this results from adding more measures. But we also enjoy improvements suggested by the managers we've rated. Take scrap performance. We originally used monthly statistics, but our business creates peaks and valleys in scrap. Our managers suggested scrap on a cumulative basis. We do it that way now. It's a better, more meaningful measure.

We used to give equal weight to every measure of a manager's performance. Now we weigh every measure in terms of its relative importance. We balance the ratings so that perfect performance will equal 100, complete failure in every dimension will equal 0.

SEVEN KEYS TO SUCCESS

Our evaluation charts aren't worth the paper they're drawn on unless our managers see them—fast. We make it a practice to start discussing performance as soon as the ink is dry. It's not possible to evaluate a man's performance on cold statistical fact. Judgment must be superimposed on the statistical data. If there are problems to correct, it's best to get on with it before the situation gets out of hand. Plans are always a joint venture, and the charts are a perfect springboard for problem-centered discussions.

We also use the charts for purposes other than correction of problems and performance appraisal.

Here are seven principles we feel will help you in using a similar system:

1. Accuracy—Proper information leads to proper decisions and action.

2. Timeliness—The sooner the information is made available the greater is its value.

3. Flexibility—As the complexion of the business changes, the system must provide the flexibility to absorb those changes.

4. Review—All measurements must be reviewed constantly for value and effectiveness. What was good last year may not apply this year.

5. Fairness—Goals that are attainable should be the prime consideration. An unachievable goal does harm. So does one that is obtained too easily.

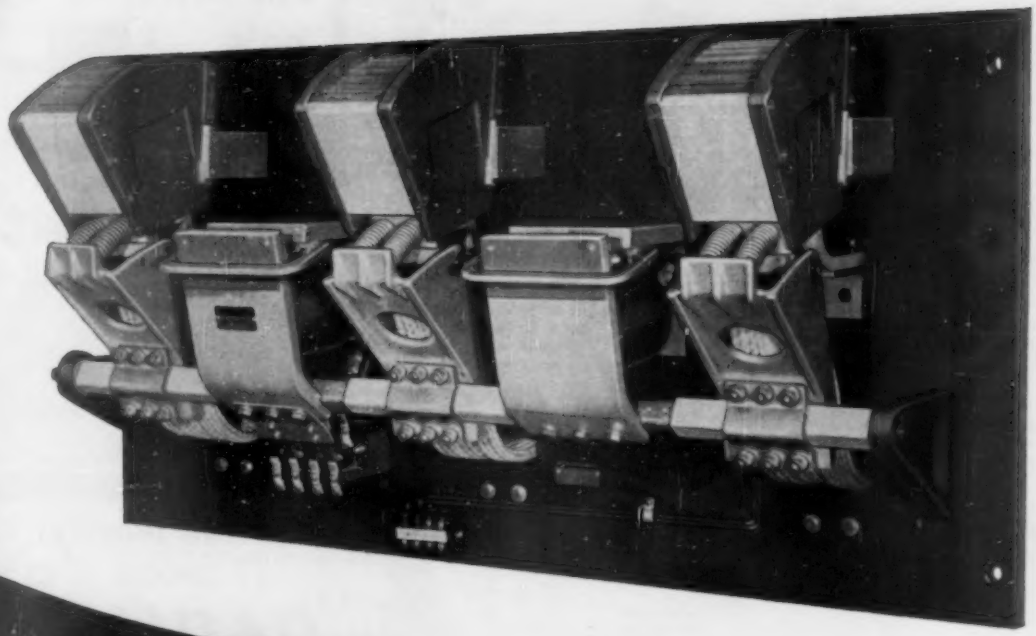
6. Judgment—Statistical data must not be the last word. Temper rating with sound judgment.

7. Periodic discussion—System must be utilized. Data should be discussed shortly after available.

FREE FILE COPY of this article available while supply lasts. Circle FC-15 on Reader Service Card next to back cover. For complete FC list, see p. 200.

For more facts circle 612 on Reader Service Card

For more facts circle 613 on Reader Service Card →



Rugged*. Simplicity

Increases contactor life in motor starters

ONE look reveals the clean, balanced design of Allis-Chalmers contactors. Fewer parts eliminate many potentially troublesome areas — mean less wear. Simple, solid construction and high interrupting capacity are positive assurance of reliability.

When you specify starters be sure to get the long-life features provided by Allis-Chalmers contactors. It is these contactors that make the complete range of Allis-Chalmers low voltage starters, from Size 4 through 8, the dependable performers they are.

Get all the facts. Call your nearby A-C sales office or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

*7th meaning, Webster's New Collegiate Dictionary, Second Edition.

A-5779

ALLIS-CHALMERS

Two 20" Transite Lines at left carry thickened pulp from thickeners to disposal pond. Smaller Transite Line at right carries water to mill.

18" Transite pipeline serves as a discharge manifold completely encircling 105-acre disposal pond.

Priced right... formulated right—

Transite Pipe offers excellent economic life in copper tailings disposal!

Few industries must dispose of anything quite like the rough, half-solid residue in copper tailings disposal. For such service the right combination of cost and long life is a must for peak system economy.

That's why engineers at Inspiration Consolidated Copper Company chose Johns-Manville Transite Pipe . . . to carry process pulp before and after thickening, and to transmit and distribute the tailings up to and entirely around the 105-acre disposal pond shown above.

Made of rugged, asbestos-cement formulation, Transite gives long life with minimum maintenance. To this, add Transite's low cost and installation economies and you see why it offers excellent economic life in process-waste disposal service.

Transite keeps installation costs low because it is lightweight, easily handled . . . and quickly assembled with the patented Ring-Tite Coupling. Goes in easily . . . with handling equipment needed only in the larger diameters.

Let us send you the informative new folder TR-51A. Address Johns-Manville, Box 14 FA, New York 16, N. Y. Send for it today!

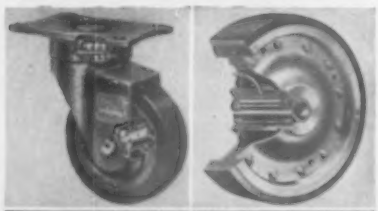
JOHNS-MANVILLE

JOHNS-MANVILLE PRODUCTS

For more facts circle 614 on Reader Service Card

Help yourself to this helpful data

Free! Manual



HELPING INDUSTRY CHOOSE

DARNELL

CASTERS AND WHEELS

THAT FIT THE JOB

FEATURES!

RUBBER TREADS . . . a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

RUST-PROOFED . . . by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

LUBRICATION . . . all swivel and wheel bearings are factory packed with a high quality grease that "stands up" under attack by heat and water. Zerk fittings are provided for quick grease-gun lubrication.

STRING GUARDS . . . Even though string and ravelings may wind around the hub, these string guards insure easy rolling at all times.

Darnell Distributors are listed in the Yellow Pages under Casters and Wheels

DARNELL CORPORATION, LTD.
DOWNEY (LOS ANGELES COUNTY) CALIFORNIA
60 WALKER STREET, NEW YORK 13, NEW YORK
36 NORTH CLINTON STREET, CHICAGO 6, ILLINOIS

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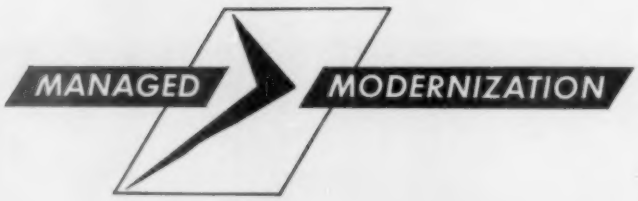


What exactly does Managed Modernization mean?

What are the dollars-and-cents reasons for its urgency—right this minute?

What are its assets as against haphazard, hit-or-miss modernization?

How much does it affect you personally?

Does it affect you as a participant in the operating management of your plant?

Why is it so vital to your company's growth and profits?

Where can you find a "Guide to Managed Modernization"—timely, complete work help?

Look! It's . . .

COMING IN NOVEMBER FACTORY

1. WHY MANAGED MODERNIZATION MAKES SENSE TODAY—2 pages.

FACTORY's concept of managed as opposed to hit-or-miss modernization. Documented with short case histories of companies that have used managed modernization with outstanding success. Will also show you how today's shortage of capital funds makes the need for systematic modernization for your plant more imperative now than ever before.

2. HOW TO MAKE AN "OBSOLESCENCE AUDIT—8-10 pages.

a. How your plant can set up its own practical "technological intelligence system" for collecting the data and disseminating the information needed for its modernization audits and evaluations.

b. How some companies are successfully making such audits.

c. FACTORY's own Obsolescence Audit Guide. This will show the reader how to review his own plant equipment systematically and how to rate it against what is currently available.

3. HOW TO PUT DOLLAR VALUES ON MODERNIZATION POTENTIAL—8-10 pages.

a. How to make operating cost comparisons between existing and proposed modernized equipment and facilities. This will be demonstrated largely through case examples.

b. How to make profit-on-investment comparisons of the various modernization proposals that compete for next year's capitalization dollar. This will be a graphic illustration of the six or eight basic ways (including FACTORY's own Profitability Index) that are available for rating the worth of a modernization proposal.

4. ALTERNATE WAYS TO GET MONEY FOR MODERNIZATION—6-7 pages.

How to decide whether to buy outright or to lease in modernization plans.

5. HOW TO SELL MANAGED MODERNIZATION PROJECTS—6 pages.

a. How to sell your immediate superior. Both sides of this problem: a manager as a "buyer" as well as a seller of modernization proposals.

b. How to get financial management on your side. Results of work with the Comptrollers Institute on a survey of comptrollers and treasurers. They will tell readers what they do that's wrong. In addition, many suggestions on what comptrollers really want.

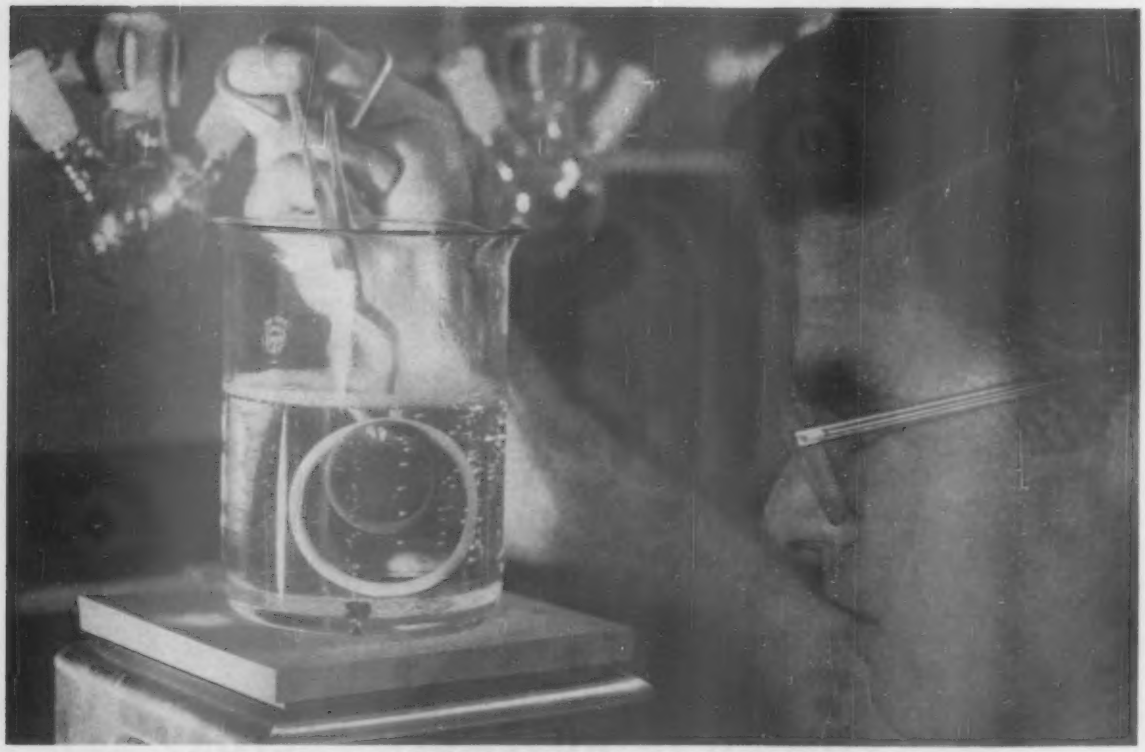
c. How to keep your ideas sold. The highly important follow-up phase of modernization. Specific suggestions on what can be done to keep projects sold once they have been approved—and to provide for continuing audits of obsolescence of equipment and facilities and concurrent evaluations of proposals.

6. PLANT OPERATING MANAGEMENT CASE BOOK—16 pages.

The full contents of this regular FACTORY "newspaper within a magazine" will be devoted to reports of actual plant experiences with modernization.

MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.



EVEN WHEN BOILED IN OIL THIS SILICONE RUBBER WILL KEEP TO SIZE AND SHAPE.

New Rubber Resists High Temperatures and Oil

A new kind of rubber has been "discovered." It combines oil resistance with ability to maintain strength and usefulness at temperatures ranging from a sub-arctic 100 degrees below zero (F.) to +500 F.

Called nitrile silicone rubber, it is said to have a unique combination of important properties never before available in a single material. At test demonstrations the new product remained impervious when immersed in hot fuels that caused ordinary silicone rubber to writhe, curl, swell into shapes larger than their original sizes. Manufacturer says nitrile silicone product can be processed in ordinary rubber fabricating equipment at minimum expense.

Applications include gaskets, O-rings, seals, rubber brake parts, hoses, and couplings.

General Electric Co. (Circle 251, Reader Service Card.)

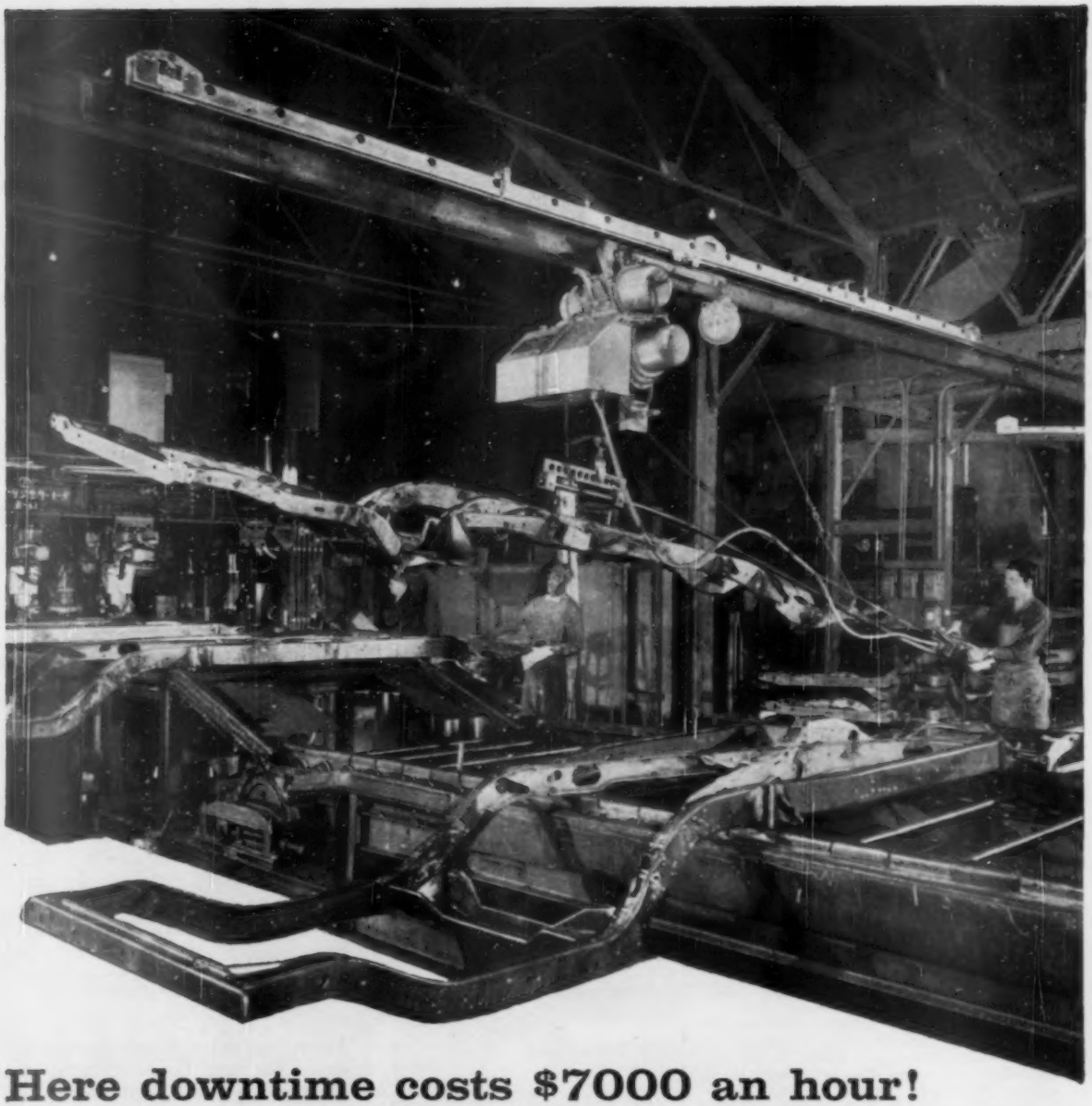
Epoxy Compound Adheres and Cures

Here's an epoxy paste capable of curing firm and hard in underwater locations. After the paste, Epocast 546, has been combined with its hardener (9514) it may be trowelled or squeegeed into position; hardening takes place in several hours. Unlike usual epoxy formulas, it will become firm overnight under moist conditions, and develop good adhesion to clay pipes, concrete, stone, metals, and other products.

Applications of Epocast 546 are in public utility installations, sanitary areas, processing plants.

Furane Plastics, Inc. (Circle 252, Reader Service Card.)

Turn the page



Here downtime costs $7000 an hour!

...so A. O. Smith uses P&H HOISTS to help prevent shutdowns

The stakes are too high to chance a breakdown on this auto frame assembly line at A. O. Smith Corp., Milwaukee, Wis. A. O. Smith production men reduce the risk by using trolley-mounted P&H Hevi-Lift® Hoists, like the one shown above, for transfer operations.

A Hevi-Lift is virtually maintenance-free; P&H ingenuity has cut wear at the spot where more than half of hoist troubles occur — at the brake.

Only the Hevi-Lift has the new RCD brake. Of heavy-duty, mill-type construction RCD substitutes a gentle, but positive direct grip for the hammer action of old-fashioned brakes... It has fewer parts to break down.

This is just one way Hevi-Lift helps cut the high cost of downtime every day in many industries. Ask your P&H distributor for a demonstration of the **P&H Hevi-Lift in action! Dept. 204B, Harnischfeger** Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H ... quality and service for 74 years

Ask Standard

how to cut costs with conveyors

Showing part of the extensive system of Standard belt and roller conveyors at General Merchandise Company. As many as 216 multiple orders from start of order picking to the shipping department can be handled in about 15 minutes.

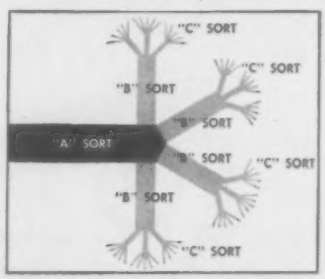
System speeds handling of 16,000 widely varied items daily

. . . for General Merchandise Company of Milwaukee

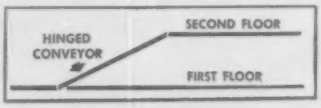
Handling and shipping as many as 16,000 daily orders, ranging from hairpins to refrigerators, could pose some difficult problems. However, this wholesale firm — with eight different buildings — has installed a mechanized materials handling system that makes it possible for almost immediate shipment of great quantities of orders from their tremendous stock.

The bulk of the job, as outlined in the photo and diagrams, is being done with an engineered system of Standard gravity and power conveyors.

To cut handling time and costs with conveyors, contact STANDARD CONVEYOR COMPANY. General Offices: North St. Paul 9, Minn. Sales and Service in principal cities.



At the central warehouse, three sorting operations separate one multiple order into 216 individual orders. "A" sort breaks these orders into four groups of 54. "B" sort breaks these down into three of 18 and "C" sort makes up individual orders.



Hinged conveyor at receiving center transports incoming items to 1st floor for sorting, marking. If material comes in ready for stock, same conveyor swings up, carries items to 2nd floor for storage.

Call the Standard engineer listed in your classified phone book, or write direct for Bulletin 309 — address Dept G-10

FACTORY / MATERIALS NEWS

Begins on page 236

For more about these items, circle item numbers on Reader Service Card next to back cover.

253—Bacterial Inhibitor for extending the life of soluble oil emulsions is called Elcide 75. It is effective in all standard duty emulsions. Supplied as a brown aqueous solution in 1-, 5-, and 55-gal. containers. Recommended use: 1 oz. in 4 gals. *Eli Lilly & Co.*

254—5-in-1 Plastic Metal Kit has been assembled in response to many requests. Contains 1 pint of clear Flawmaster epoxy and 5 jars of powdered metals. Powders are mixed with epoxy for metallic bonding. Clear epoxy is used to bond glass, wood, etc. *Carl H. Biggs Co.*

255—Low Carbon Flat Stock (Starrett No. 498) is an 0.18 carbon, fine-grained, silicon-killed steel of forging quality. Precision ground, ends are machined square, edges are ground parallel and square. Comes in 24-in. lengths, widths ⅜ to 16-in. *L. S. Starrett Co.*

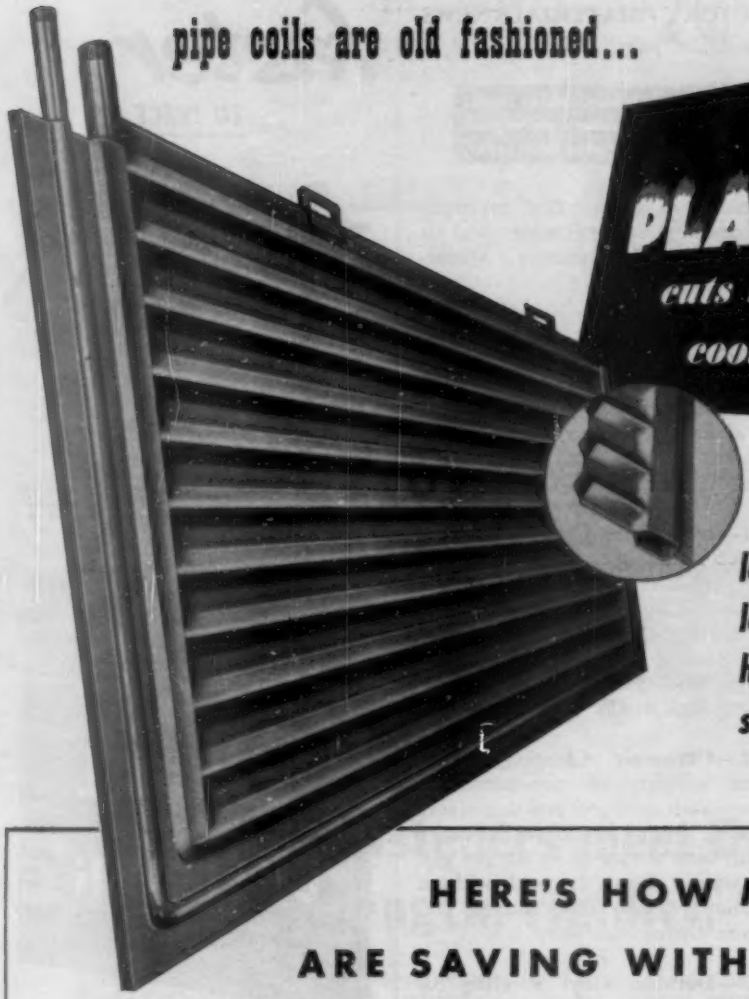
256—Oxi Crystals for chemically cleaning the entire fire side of boilers are non-explosive, non-corrosive, and non-poisonous. All combustible deposits are completely oxidized from firedoor to top of stack. Use of soot blowers can be reduced. *Oxi Corp.*

257—Decorative Plastic Laminate, called Universal Grade Micarta, replaces two grades (postforming and non-postforming) formerly available. New laminate fabricates easily, has good abrasion resistance, meets NEMA standards for postforming. *Westinghouse Electric Corp.*

258—Internal Cleaning Liquid for air compressors, Hydrodyne-AC, is fed into air intake lines by a drip feed lubricator to remove carbon and eliminate carbon build-up on all valves and rings. Liquid emulsifies carbon and removes it automatically. *Aquadyne Corp.*

259—Barrier Material, Scotchpak, is made of a tough, heat-sealable polyester film vacuum-metalized and bonded to a backing of scrim. Film

pipe coils are old fashioned...



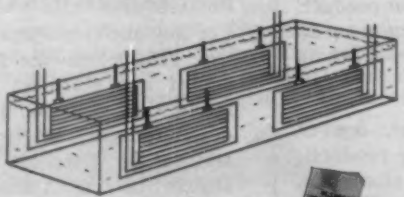
modern PLATECOIL® cuts heating and cooling costs

low installation costs
low maintenance costs
high heat transfer efficiency
space and weight savings

HERE'S HOW MODERN PLANTS ARE SAVING WITH PLATECOIL®

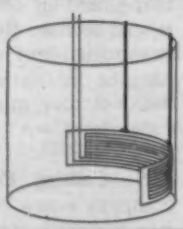
PITTSBURGH PLATE GLASS SAVES WITH PLATECOIL® IN ANODIZING PROCESS

PLATECOIL replaced pipe coils which were used to heat cleaning tanks, etch tanks, wash and sealing tanks at PITTSBURGH PLATE GLASS Works No. 19 at Kokomo, Indiana. In this installation, the user reports that installation and maintenance costs have been reduced to half the cost of using pipe coils. PLATECOIL also required half the space needed for pipe coils. Higher efficiency resulted in the use of fewer units.



PLATECOIL® SAVES BADLY NEEDED SPACE IN KIERS, SLACK WASHER AT CAROLINA MILLS

Tranter PLATECOIL replaces pipe coils for heating water in a slack washer and for heating kier liquors at Carolina Mills, Inc., Newton, North Carolina. The principal reason for the installation was to save space. The compact design and construction of Tranter PLATECOIL units, which permit more effective heat transfer while requiring less space, save badly needed space in the kiers and the washers. An additional advantage has resulted from use of PLATECOIL units in the kiers — the units are much more accessible than pipe coils for periodic cleaning which is required. Their solid and relatively flat surfaces are also easier to clean. Installed as a unit, PLATECOIL may be removed and replaced easily and quickly.



SEND FOR FREE BULLETIN P-60

Tranter Manufacturing Inc.

LANSING 9, MICHIGAN

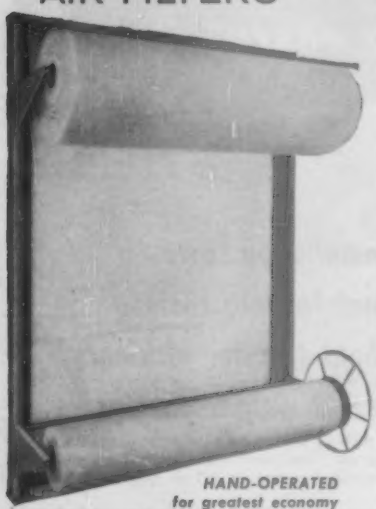
PLATECOIL® DIVISION

OUTMODED

BY

CONOMANUAL

AIR FILTERS



HAND-OPERATED
for greatest economy
Dry-type Synthetic Media
for greater convenience

NEW CONOMANUAL
gives the convenience of a roll-away, dry-type filter at low, low cost.

CONOMANUAL requires the VERY MINIMUM OF ATTENTION. A turn of the hand-wheel advances fresh media when needed. The loaded synthetic media is wound, dirty-side-in on its disposable core—easily removed without dirt, grease, or "shedding" problems.

To get complete information on the new CONOMANUAL mail coupon below for Bulletin #850 to

CONTINENTAL
AIR FILTER, INC.
2520 Helm Street, Louisville 8, Kentucky

Please send me Bulletin #850.

NAME_____

ADDRESS_____

_____

FACTORY / MATERIALS NEWS

Begins on page 236

For more about these items, circle item numbers on Reader Service Card next to back cover.

is said to have more flex, improved oil and grease resistance, and is thinner than foil laminate. *Minnesota Mining & Mfg. Co.*

260—Neutralizer Compound, 117-C, is for preventing rusting and tarnishing of iron and steel parts after surface finishing. This product is a dry, non-abrasive blend of alkaline materials, and is completely soluble. *Roto-Finish Co.*

261—Ice Melting Chemical, known as Ice Rem Super, is composed of thin, crystalline chips that are said to have an almost unlimited number of "active" faces. Chips adhere to any surface—will not roll down ramps or steps, will stay put even during high winds. *Speco, Inc.*

262—Ultrasonic Cleaning equipment consists of non-flammable water-wash detergent and degreasing solvent. Blast 1 is additive for water baths used at rate of ½ oz. per gal. of water. Blast 2, used without dilution, cleans solder fluxes, etc. *Narda Ultrasonics Corp.*

263—Durable Vinyl Sheeting for reducing window heat and glare is called Tox-Shade. It can be applied to windows "in seconds" without adhesives—just squeegee the material to a pane of glass and firm bond results. Can be taken off, stored for future use. *Toch Brothers.*

264—Flexible Duct Liner of Fiberglas (mat faced) for heating, ventilating, and air conditioning systems, is said to have the lowest resistance to moving air of any similar product. May be used at air velocities up to 4000 ft. per min. *Owens-Corning Fiberglas Corp.*

265—Calking Compound, one of company's new Neoprene products, is a sealing material for aluminum, steel, wood, concrete, etc. Of calking gun consistency, it dries quickly and cures into a tough elastic synthetic rubber in less than a week. *The Crichton Co.*

Turn the page

faster
TO ERECT

faster
TO RE-ARRANGE

faster
TO PAY FOR ITSELF

faster because **... the exclusive Deluxe patented *boltless* shelf bracket replaces 90% of time-consuming nuts and bolts, providing quick installation and quick, easy shelf adjustment.**

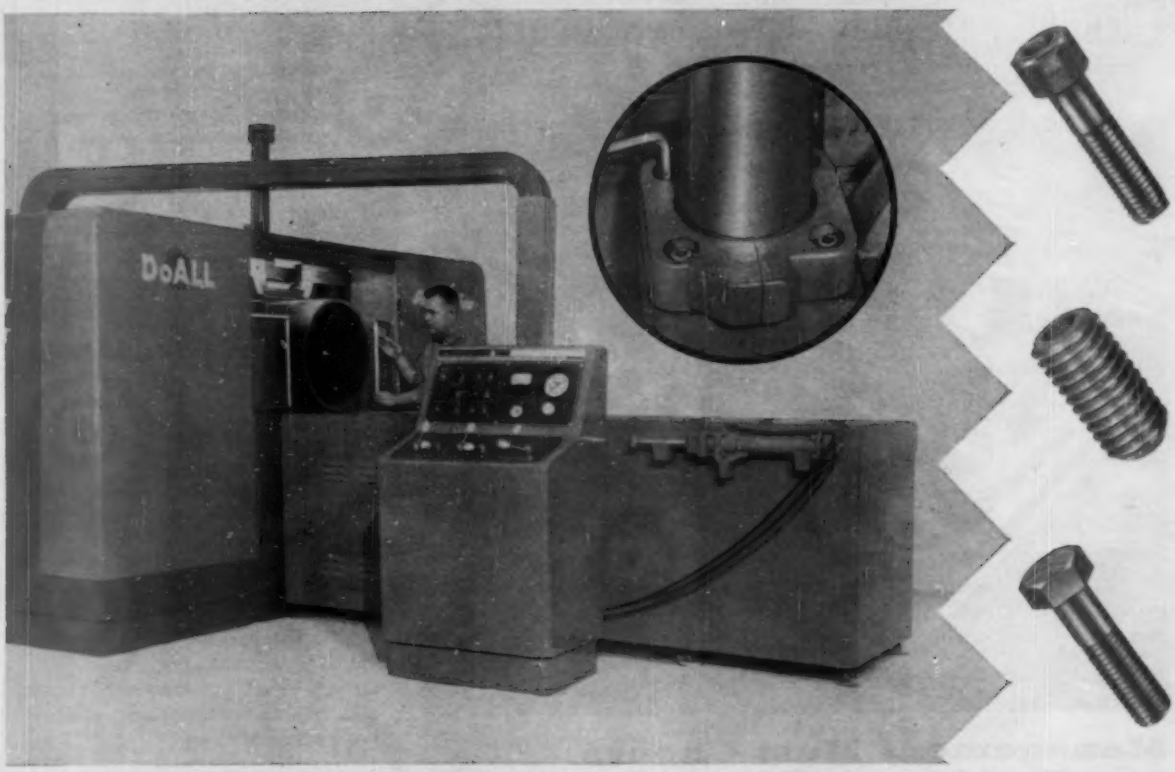
Proof of this has been demonstrated again and again at trade shows where two men erected a complete section of Deluxe Shelving in less than 5 minutes.

For any shelving storage problem, use Deluxe—the finest-designed and sturdiest shelving made. Call your local Deluxe dealer for quick, efficient layout service. Or write for the new Deluxe Shelving Catalog #30.

DELUXE METAL FURNITURE CO.
Warren 8, Pa.
A division of the Royal Metal Mfg. Co.

DELUXE

IT PAYS TO STANDARDIZE ON STANSCREW



Stanscrew fasteners meet DoALL standards for high strength, rigidity, "clean" design

This outstanding machine was developed by the DoALL Company to handle industry's largest, toughest cut-off jobs. Not a beefed-up model of existing machines, this "biggest band saw built" is a unique new design. As one example, the cutting head travels vertically, but cutting takes place on the lower edge of the top saw band.

The new design of this unit, Model C24, therefore represents an entirely new concept of rigidity, applied power, and precision control. These basic considerations dictated the selection and application of every part . . . including, of course, the fasteners.

Small wonder, then, that DoALL's design engineers, after consultation with Stanscrew's fastener specialist, selected Stanscrew socket cap screws for vital applications such as attaching hydraulic cylinders. These reliable fasteners provide the high strength needed. Correctly applied, they give assurance against misalignment even after extensive use—a must in this precision machine. And, by permitting flush, snag-free surfaces, the fasteners also contribute to the C24's superior styling.

Like DoALL, other leaders of American industry are learning the advantages of calling in a Stanscrew specialist when a new product is on the drawing boards. His wide experience can often suggest ways to cut fastener or assembly costs . . . for example, by substituting a standard fastener for a costly special. He can make suggestions from Stanscrew's complete line of over 4,000 types and sizes, always in stock and quickly available.

So whatever your requirements in fasteners, call your Stanscrew distributor today. He will gladly arrange for a prompt visit from the Stanscrew fastener specialist.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

REDUCE COSTS...OR REDUCED PROFITS

Management Must Choose The Way to New Economies

The squeeze is on!
High-cost producers are now discovering it impossible to cover inefficiencies in production by raising prices.
But — companies which do an effective job of cutting product handling costs
are finding that they can double or triple last year's percentage of profit.

It takes A-F *"Engineered Movement"*—
a completely coordinated, plant-wide system of controlled parts and product flow—
to lower operating and maintenance costs *appreciably*,
free money tied up in in-process inventories,
reduce paperwork, and recover valuable floor space for more productive uses.

Since 1901, A-F has specialized in helping all types of plants reduce product handling costs.
If this is what *you* want for *your* plant
why not write us — without obligation — today!

A-F

A-F *ENGINEERED* CONVEYING SYSTEMS
Also Pre-Engineered Conveyors—
Wheel, Trolley, Roller, Belt
Metal Cleaning and Processing Machines

YOU CAN SEE THE SUPERIORITY OF A-F CONVEYOR ENGINEERING

THE ALVEY-FERGUSON CO., 134 Disney St., CINCINNATI 9, OHIO and Azusa, California

FACTORY / MATERIALS NEWS

Begins on page 236

For more about these items, circle item numbers on Reader Service Card next to back cover.

266—Furniture Wax can be sprayed directly on a surface or on dust cloth to permit dusting and waxing as one operation. Called Shine-Up, it gives long-lasting shine and can be used on wood, other surfaces. *S. C. Johnson & Son, Inc.*

267—Silicone Sponge in sheets to 36-in. wide can now be produced by the calendering method and combined with orlon, dacron, nylon, other heat resistant fabrics. Complex silicone sponge shapes can be extruded. *The Stalwart Rubber Co.*

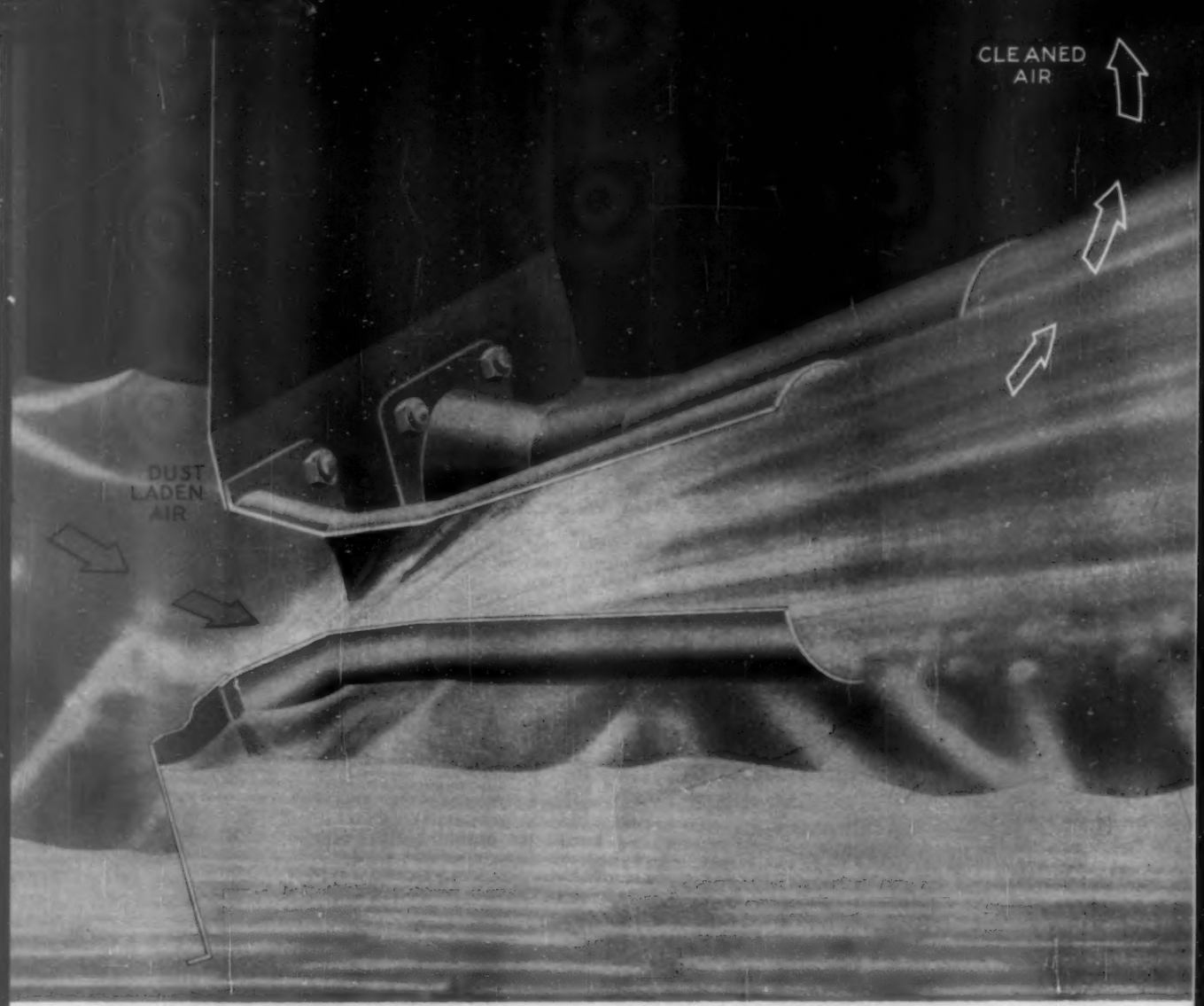
268—Sealing Resin is a liquid with a surface tension lower than capillary resistance of smallest pores. Impal penetrates pores and, after curing, forms seal that resists acids, alkalies, saline atmosphere. *Columbia Technical Corp.*

269—Carbon Brick for blast furnace linings is said to have a lower permeability than any previously made and should result in greatly reduced gas penetration. Bricks are formed in large presses, simultaneously baked with high electric currents. *National Carbon Co.*

270—Glass Steel is a new tough glass with greater resistance to thermal shock and abrasion. Called Glasteel 59, it is now company's standard for all process equipment. Resists all acids except hydrofluoric. *The Pfaudler Co.*

271—Three Titanium Alloys, all all heat-treatable, are available. One is said to be the first heat-treatable all-Beta alloy produced. All three can be formed in the "soft" condition and then strengthened by simple thermal aging treatments. *Crucible Steel Co. of America.*

272—Plastic Packing Material is said to be new approach to biological treatment of liquid wastes. Dowpac consists of layers of corrugated sheets of Styron or saran. Assembled in self-supporting units, can be stacked 42 ft. high with simple under drains. *Dow Chemical Co.*



Puts the squeeze on difficult dusts

Pangborn Ventrijet Wet Dust Collector uses exclusive venturi tubes for peak efficiency

That pinch-necked venturi tube is the secret behind Pangborn Ventrijet performance. As dust-laden air flows through these tubes, the constriction creates a low-pressure area which draws water into the air stream. The resulting turbulence breaks the water into particles which actually *wash* the dust from the air. The simplicity of Ventrijet design saves money in its ease of installation, its low cost of operation and maintenance.

Although the Ventrijet is particularly suited to collecting hot, moist, inflammable, corrosive and obnoxious dusts, the Pangborn engineering it typifies is important to *any* dust-producing plant. It is not enough to put a dust collector within a plant. An efficient dust control system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This thinking is incorporated into every Pangborn proposal.

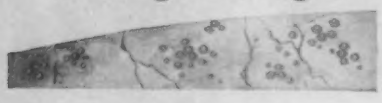
The Pangborn Engineer in your area will be glad to go to work for you. He is a dust expert *and will discuss your individual problem at no obligation. And, for more information, write for Bulletin 922 to:* Pangborn Corp., *2100 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn Ventrijet Wet Dust Collector on the job. This is just one of Pangborn's comprehensive line of wet and dry dust collectors.

Pangborn CONTROLS DUST

For more facts circle 623 on Reader Service Card

finished with Swift's
ADCOTE
by Trowel · Brush · Spray
gives the
following advantages



CLEAN WHITE SURFACE
GOOD COLOR STABILITY
GOOD CHEMICAL & MOISTURE RESISTANCE
FIRE RETARDANT
RESISTS MOLD AND RODENTS
WASHABLE

It's not a plaster . . . not a paint. Swift's Adcote wall finish was especially developed to provide industrial users with a high moisture resistant finish that is easy to apply yet has good adhesion to many different surfaces and presents a clean, white, uniform appearance.

One trial is worth a thousand claims.

Possible Uses

Refinishing concrete surfaces
Imparting moisture resistance to concrete blocks
Resurfacing of brick walls
Finishing damp surfaces
Imparting moisture resistance to basement walls
Adhesive for the erection of ceramic tile
Finish for board-type insulation
Adhesive for board-type insulation

Swift — *To Serve Your Industry Better*

MAIL COUPON FOR FURTHER INFORMATION

Swift & Company
Adhesives Products Department
Chicago 9, Illinois

☐ Send descriptive bulletin
☐ Send information on trial order

Name_____

JUST CLIP TO LETTERHEAD AND MAIL

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

MAINTENANCE

346—Work Platform. Circular tells about telescoping aluminum work platform. Up-Right Scaffolds, Inc.

347—Lubricants. Free data book—treatise on lubrication. Lubriplate Div., Fiske Bros. Refining Co.

348—Floor Maintenance. Free 32-page floor care booklet gives facts on modern floor care. Masury-Young Co.

349—Lubricants. Illustrated bulletin describes multipurpose lubricant and hydraulic fluid. Gulf Oil Corp.

350—Hydraulic Cement. Brochure: "How To Do It," for repairing water leaks. Standard Dry Wall Products, Inc.

351—Machine Mounts. Complete set of "Facts" books fully describes mounting pads. Unisorb Div., Felters Co.

352—Lubricants. New guide: "Management Practices that Control Costs via Organized Lubrication." The Texas Co.

353—Roofs. Free booklet (40 pages): "Things You Should Know About Your Roof." Johns-Manville Corp.

ELECTRICAL

354—Motors. Literature gives detailed information on complete line from 1 to 600 hp. Brook Motor Corp.

355—Motor Starters. Bulletin SM-275 gives full story of one-piece overload relays. Square D Co.

356—Power Centers. Booklet DB34-150 tells how to set up electrical system. Westinghouse Electric Corp.

PRODUCTION

357—Arc Welders. Bulletin SB-1362 contains specifications and engineering data. Lincoln Electric Co.

358—Portable Tools. Free catalog fully describes complete line of industrial tools. Remington Arms Co.

359—Valves. Catalog illustrates and describes full line of air control products. A. Schrader's Son.

360—Graphic Instruments. Catalog Section 50 lists capacities, describes applications. Esterline-Angus Co.

361—Heat Transfer. Bulletin P-60: "How To Cut Heat Transfer Costs With Plate Coil." Tranter Mfg. Co.

362—Schedule Board. Bulletin X-400 shows varied application of visual control board. Graphic Systems.

363—Controlled Air-Power Devices. Booklet available: "Automation Can Fit into Your Picture." The Bellows Co.

364—Paint Spraying. No. 2 Process Brochure: electrostatic spray painting. Ransburg Electro-Coating Corp.

365—Hydraulic Cylinders. Catalog SM-56-2 provides full engineering details. Tomkins-Johnson Co.

366—Tool Control System. Booklet: "How Tool Costs Were Cut 12 Ways in 20 Plants." McCaskey Div.

367—Transmission. A-640-A on drives and couplings; A-638, roller bearings; A-606-A, V-belts. Dodge Mfg. Corp.

368—Speed Reducers. Bulletin on shaft-mounted speed reducers, capacities 1 to 100 hp. Dodge Mfg. Corp.

369—Adjustable-Speed Drives. Bulletin GEA-6643 describes new packaged speed variator. General Electric Co.

PLANT SERVICES

370—Air Compressors. Catalog C-50 describes single and two-stage lines, ½ to 25 hp. The DeVilbiss Co.

371—Unit Heaters. Bulletin 564 gives details on many new features of the new Counterflo heater. Dravo Corp.

372—Air Filters. Bulletin 850 gives full data on new roll-away, dry-type filter. Continental Air Filter, Inc.

373—Steel Shop Equipment. Special catalog gives facts on shop furniture and shelving. Burroughs Mfg. Co.

374—Pipeline, Drainage Cleaner. Helpful data on flow-line and drain cleaning machine. Kollmann Mfg. Co.

375—Steel Shop Equipment. Catalog 100 (84 pages) describes and illustrates diversified line. Lyon Metal Products.

376—Unit Heaters. "Modern Heating" describes various features of gas-fired heaters. Reznor Mfg. Co.

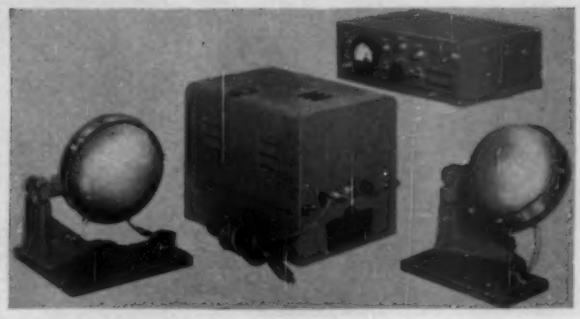
377—Paper Towels. Free bulletins available on controlled roll paper towel dispensers. Steiner Co.

378—Dust Collector. Bulletin 52A covers continuous, automatic self-cleaning. Pulverizing Machinery Div.

Turn the page

BURGLARS BEWARE!

1. Install a Kidde Ultrasonic Burglar Alarm System, and thieves don't stand a chance. Even a lock-in's first move gives him away! *And* the system is *tamper-proof!*



2. The Kidde Ultrasonic Burglar Alarm System is extremely portable, easy to install, plugs into any standard AC electrical outlet. Can be moved to new locations.

3. From small units like the one shown above, sound waves too high to be detected saturate the entire area, give *complete* wall-to-wall, floor-to-ceiling protection.

4. Any movement in the protected area immediately triggers an alarm. System may be connected to a central alarm station, as illustrated in the photo above.

5. In a proprietary system, the Kidde Ultrasonic Burglar Alarm sounds alarm in guard rooms, can also sound alarm at local police station, insures immediate detection.

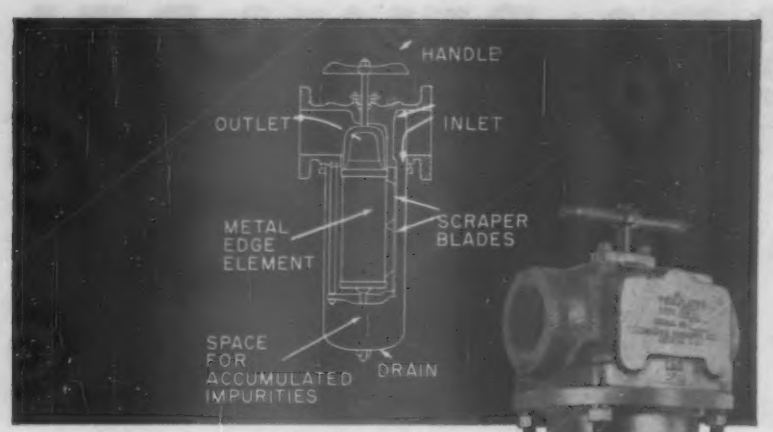
6. If preferred, local "on-the-spot" alarms may be used. Whichever method is employed, with the Kidde Ultrasonic Burglar Alarm System you get *fast sure* protection.

Simple to install, easy to maintain,
the Kidde Ultrasonic Burglar Alarm System represents a great step forward in the security field. Transmitting waves of sound too high to be heard by the human ear, the Kidde system immediately detects any attempt at a break-in, gives complete wall-to-wall, floor-to-ceiling protection. Properly installed, the Kidde system qualifies for an Underwriters' Laboratories Number Two certification. Write for more information about truly low-cost burglar protection.

Kidde

ULTRASONIC DIVISION
Walter Kidde & Company, Inc.
1032 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd.,
Montreal — Toronto



This one standard Purolator filter is

EXACTLY RIGHT for all these fluids:

- inks
- paints
- varnishes
- food products
- greases
- process fluids
- fuel and lube oils

SPECIFICATIONS: This Purolator filter—model G-141J—is designed for filtration in a range upward of 40 microns.

It can be installed on pressure or suction side of pump.

It is recommended for capacities of from 6 to 200 GPM, dependent on viscosity. Spacing varies from .0010 to .020.

Relief valves set from 10-12 (generally 15 to 20) to 50 PSI are incorporated in several models.

Motor driven knife blade to clean element can be furnished whenever conditions make manual rotation impractical.

Maximum pressure: 125 PSI; Weight: 37 lbs. Equipped with simplex full-flow metal element oil strainers.

Available in all stainless steel construction for corrosive liquids, process fluids, food products.

If this filter's specifications recommend it for a problem of yours, write for catalog sheet to Dept. PF2-101.

Filtration For Every Known Fluid

PUROLATOR PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

ADVERTISERS' LITERATURE

Begins on page 244

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

379—Fans, Ventilators. Bulletins FI-110 and 3720-A on industrial exhausters, ventilators. Buffalo Forge Co.

380—Filters. New catalog describes Fulflow Filters engineered to exact requirements. Commercial Filter Corp.

381—Washrooms. Booklet has diagrams, illustrations, and ideas on washroom advisory service. Scott Paper Co.

382—Compressed Air. Bulletin 711 describes features of aftercooler, cyclone separator. R. P. Adams Co.

BUILDINGS

383—Floor Grating. Color catalog (20 pages) on "Gridsteel" floor armor. Irving Subway Grating Co.

384—Partitions. New "C" System brochure tells newest, best, most economical approach. Bestwall Gypsum Co.

385—Flooring. Descriptive folders on vinyl tile give colors, sizes, thicknesses. Azrock Floor Products Div.

386—Rolling Steel Doors. No. G-58 describes manually, mechanically, electrically operated types. R. C. Mahon Co.

387—Plant Sites. Free booklet states facilities available for new plant locations. Reynolds Development.

MATERIALS HANDLING

388—Casters and Wheels. Free manual has helpful data on casters and wheels. Darnell Corporation, Ltd.

389—Hoists. Complete catalog on electric chain and wire rope hoists and hand hoists. Chisholm-Moore Hoist Div.

390—Dock Leveler. Catalog InW-21 gives complete data on weatherproof adjustable dock. The Colson Corp.

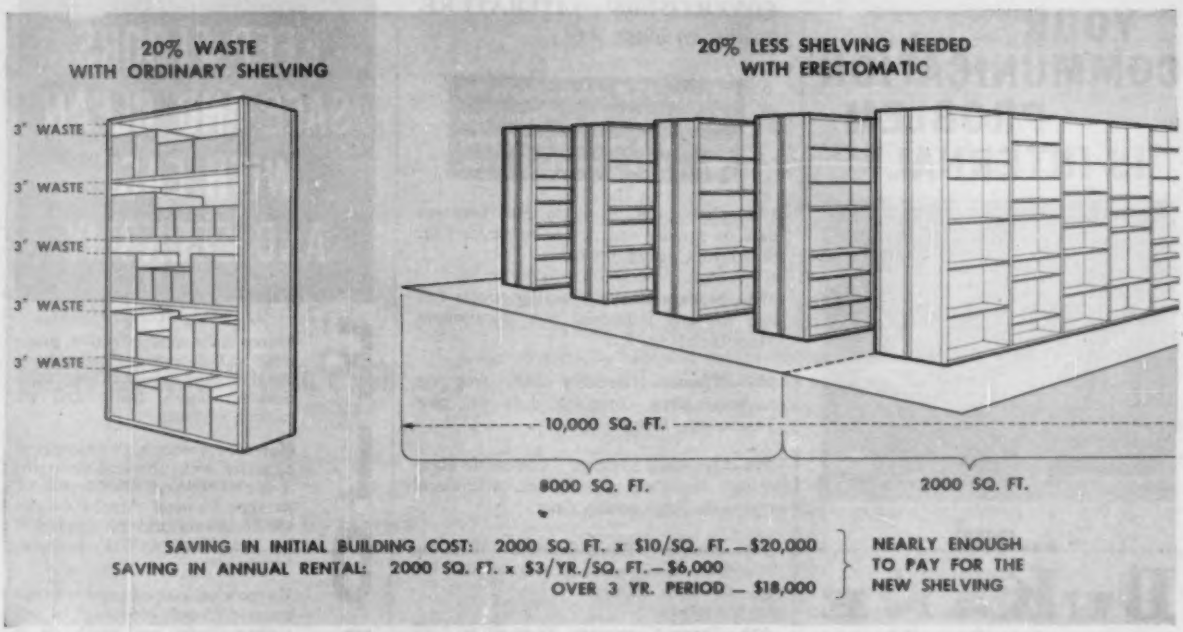
391—Safety Hooks. Data sheet gives full info on safety hooks for varied application. E. D. Bullard Co.

392—Storage Racks. Catalog lists 800 sizes and capacities from 5 basic parts. American Metal Products Co.

393—Steel Shelving. New Catalog 30 gives complete info on structural features. Deluxe Metal Furniture Co.

394—Casters. Condensed 20-page Catalog 157-G lists various sizes and applications. Faultless Caster Corp.

Turn the page



A typical example of the savings in space made possible by Hallowell ERECTOMATIC steel shelving is illustrated above.

8000 square feet of Hallowell *ERECTOMATIC* Steel Shelving can hold as much as 10,000 square feet of ordinary shelving

Reduction in floor space and shelving is made possible by quick-change shelf positioning and exclusive corner post construction, permitting more effective utilization of area between shelves.

More effective utilization of the area between shelves can provide major savings in industrial and commercial shelving installations—whether you own, rent, or are planning to build the area required for storage.

Hallowell ERECTOMATIC® Steel Shelving permits such utilization. Quick-change shelf positioning eliminates waste in vertical spacing, increases the usable storage area by as much as 20%. Exclusive corner post construction permits full utilization of shelf width, too. Typical savings in initial building costs and annual costs are listed in the tables opposite. Ask your authorized Columbia-Hallowell dealer for details.

Or write Columbia-Hallowell Division, SPS, Jenkintown 11, Pa. or SPS Western, Santa Ana, Calif.

SAVINGS IN INITIAL BUILDING COSTS
(per 100 sq. ft. of storage space eliminated)

% floor space saved by ERECTOMATIC	Building cost per 100 sq. ft.								
	$700	800	900	1000	1100	1200	1300	1400	1500
5	$ 35	40	45	50	55	60	65	70	75
10	70	80	90	100	110	120	130	140	150
15	105	120	135	150	165	180	195	210	225
20	140	160	180	200	220	240	260	280	300

SAVINGS IN ANNUAL COST
(per 100 sq. ft. of storage area saved)

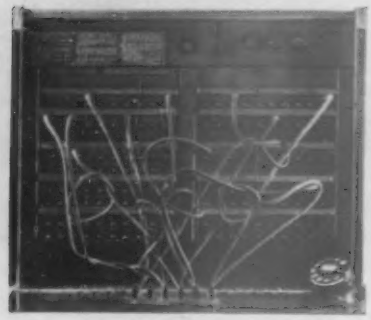
% floor space saved by ERECTOMATIC	Cost (per year) per 100 sq. ft.									
	$100	200	300	400	500	600	700	800	900	1000
5	$ 5	10	15	20	25	30	35	40	45	50
10	10	20	30	40	50	60	70	80	90	100
15	15	30	45	60	75	90	105	120	135	150
20	20	40	60	80	100	120	140	160	180	200

SPS **Jenkintown • Pennsylvania**

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

For more facts circle 627 on Reader Service Card

YOUR COMMUNICATION PROBLEM IS INTERNAL!



...and DUKANE can solve it

Instant communication by DUKANE saves time and steps. DUKANE provides dependable intercom, private automatic telephone, paging, emergency alarm and evacuation, and background music facilities. DUKANE systems may be used separately or in combination, for complete flexibility and versatility. DUKANE'S communication systems are custom-engineered from mass-produced components—give you the most economical combination for your individual communication needs.

ONE SYSTEM...ONE MANUFACTURER...ONE RESPONSIBILITY GIVES YOU

- emergency evacuation
- time and work-break signals
- inspection control
- background music
- private telephones
- complete intercommunication

DUKANE

Find Your Nearest Distributor In The 'Yellow Pages'

DuKane Corporation, Dept. F-108s
St. Charles, Illinois

Send me information on DuKane systems for better business management.

Name_____

Company_____

Address_____

City & State_____

DuKane sound systems are installed and serviced by a Coast-to-Coast network of more than 300 engineering distributors

ADVERTISERS' LITERATURE

Begins on page 244

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

395—Conveyors. Bulletin 309 contains data on gravity and power conveyor line. Standard Conveyor Co.

396—Storage Racks. Catalog covers full line for any industrial use. Equipment Manufacturing, Inc.

397—Tractor. Bulletin 588, free on request, gives complete data on new Tractorox. Barrett-Cravens.

398—Tramrail System. "Automatic Handling" describes applications. Cleveland Crane & Engineering Co.

399—Mobile Electrification. Catalog describes mobile-electrification system for cranes. Insul-8-Corp.

400—Screw Conveyors. Data Book 2289 describes complete engineered screw conveyor system. Link-Belt Co.

MISCELLANEOUS

401—Gloves. Free catalog makes it easy to select right gloves, lengths, weights, finishes. Wilson Rubber Co.

402—Joining Strips. Data on 90 and H joining strips for PVC sheet stock. Colonial Plastics Mfg. Co.

403—Gloves. Guide with "wear test" performance chart helps choose right glove for every need. Hood Rubber Co.

404—Reproduction Materials. Handy wall chart for quick guide to better printmaking. Eastman Kodak Co.

405—Industrial TV. Illustrated brochure describes complete ITV equipment and systems. Philco Corp.

406—Dermatitis. Booklet (24 pages): "Control of Dermatitis in Industry." West Chemical Products, Inc.

Free File Copies . . .

. . . of selected FACTORY articles are available if you use Reader Service Card, next to back cover. For complete description of titles see page 200. Pick your titles, then circle appropriate numbers on Reader Service Card, tear out card, drop it in nearest mailbox. Offer is good (in U.S. and Canada) as long as our supply lasts.

We'll be announcing new Free File Copy titles next month.

KEEP FLOORS SAFE AND CLEAN WITH EASE AND ECONOMY

FLORCO®

Florco is the most effective, practical and economical adsorbent for the maintenance of dry, safe, non-slip floors, decks and all porous surfaces.

Florco combines high adsorption capacity with physical strength; it is one of the few materials of its type to meet Armed Forces specifications and be approved by the Underwriters' Laboratories, Inc.

Florco's unique adsorptive properties prevent "bleeding" of adsorbed liquids and materials to cleaned surfaces.

Florco contains less "micro-dust" than any other similar material.

Florco is safe to use on all types of surfaces, creates no health hazard, is non-flammable, provides a rough non-skid surface upon which it is safe to walk and work.

Florco usage does not require special costly applicators or removal equipment.

Send today

for free demonstration sample and descriptive pamphlet on Florco. Just enclose this ad with your signed business letterhead.

FLORIDIN COMPANY
ADSORBENTS

Dept. P, P.O. Box 989 Tallahassee, Florida

Maintain constant visual control of critical manufacturing processes...

with sharp, clear
Philco Industrial TV Systems

HERE is a new dimension in plant automation and supervisory process control. See where you can't be . . . every critical area . . . from a single, central control point.

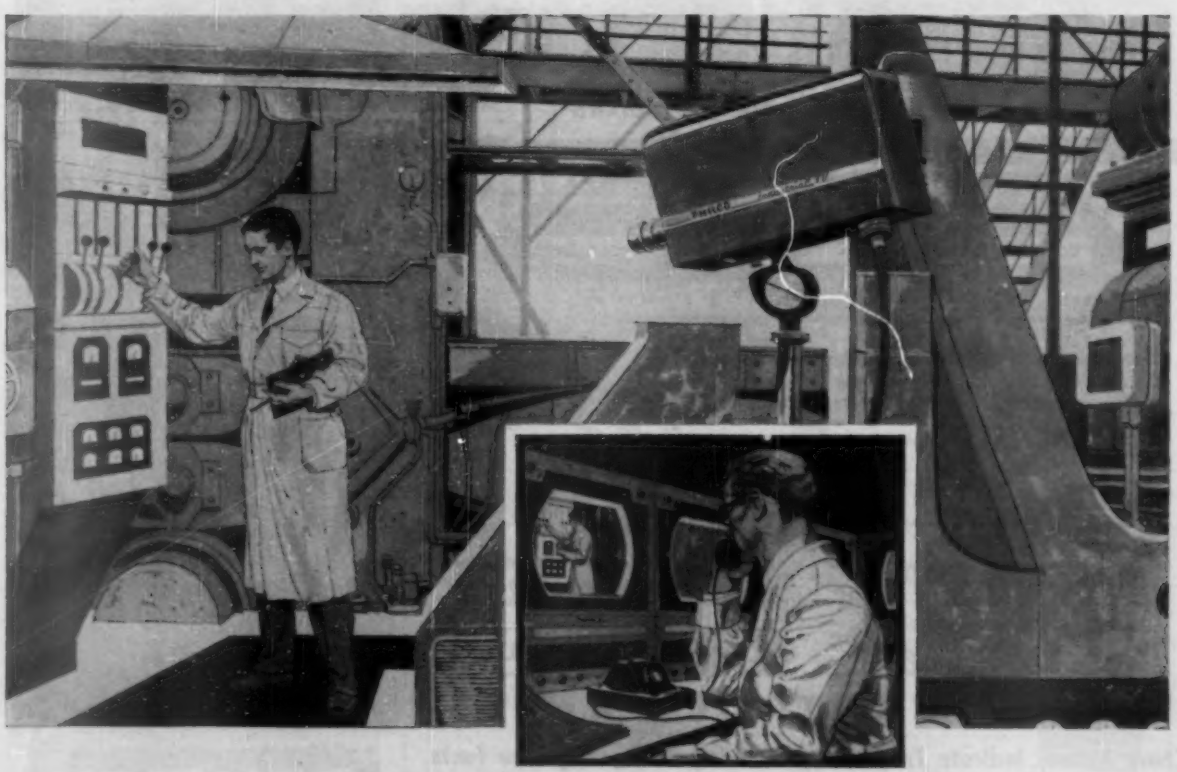
With a new, high-definition Philco ITV system you can maintain constant visual control over materials in-process, hot rolling and forming, chemical and catalyst flow, batching and mixing operations, positioning of materials and assemblies in process, crushing and grinding operations and all other manufacturing operations.

Philco's picture brilliance is unsurpassed. Details are sharp and clear. You can actually read gauges and dials at light levels as low as 10 foot candles.

Philco's complete line of ITV accessories extends the use of your basic system and permits maximum flexibility. Remote pan and tilt . . . remote iris and focus . . . Auto-Zoom lenses . . . lens turrets . . . weatherproof housings . . . explosion resistant housings . . . all assure complete versatility and adaptability to any installation through Philco's "building block" techniques.

For economical and efficient remote visual control . . . specify Philco ITV Systems. Send for illustrated brochure, describing complete Philco ITV equipment and systems.

At Philco, opportunities are unlimited in electronics and mechanical research and engineering.



PHILCO®

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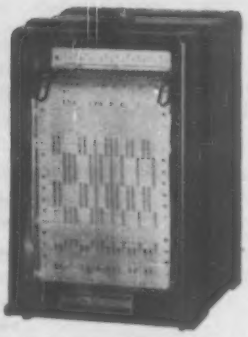
- Time of failure in life tests?
- Length of phone calls?
- Sequence of switching?
- Timing of events?

The operation recorder will obtain the answers to these problems, and many more, for you. An instrument with 20 pens writing on a moving chart, the operation recorder shows:

- *When events occur*
- *How long they last*
- *How frequently they occur*
- *The relationship of a series of events to each other*

Ask for Catalog Section 50



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Wholesale florist reports stapling 3 times faster than previous method.

Huge stapled carton cuts packing time for 14-foot boats by 50%.

Stapled cartons for nails cost less and weigh less than wooden kegs.

Slash your shipping room costs with Bostitch stapling

Stapling is faster than taping for sealing cartons of lighting fixtures—holds better, too.

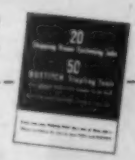
Extra profits and competitive advantages were formerly hidden in these shipping rooms. They were found when the change was made to light, rugged corrugated cartons sealed with Bostitch stapling.

Gone are the wastes of outmoded closure methods. In their place are combined benefits of many Bostitch savings.

Bostitch stapling is faster than other closure methods. Staples cost less than other fastening materials. Strong stapled containers carry heavy goods safely and cushion fragile contents in shipment. Shipping costs of stapled corrugated containers are lower than for heavier materials.

350 Bostitch Economy Men work out of 123 U. S. and Canadian cities. Your nearest one will give you facts on shipping room stapling savings. You'll find him under "Bostitch" in your phone book, or mail coupon below.

Whatever you ship, Bostitch savings can give you an important competitive advantage. Send for free Shipping Room Booklet.



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Name _____

Company _____

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Please send me your Shipping Room Booklet.

We now ship _____ (Product) in _____ (Kind of container).

Fasten it better and faster with

BOSTITCH
STAPLERS AND STAPLES

WHATEVER the JOB . . .

There's a HOOD Glove that fits it best

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"GRIP-ALL"
Coated with coarse rubber dust for handling slippery objects. One of 29 different styles.

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Accommodates many sizes

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Avoids lifting and possible injury in moving ash cans, garbage cans, oil drums. Practically all size cans fit into 19½" outside diameter ring; oil drums fit over it. Heavy duty steel construction, for long years of trouble-free service. Four 2-inch iron wheel casters. Shipping weight 15 lbs.

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All-aluminum for loads to 200 lbs. For home or industry. Fits most cans.

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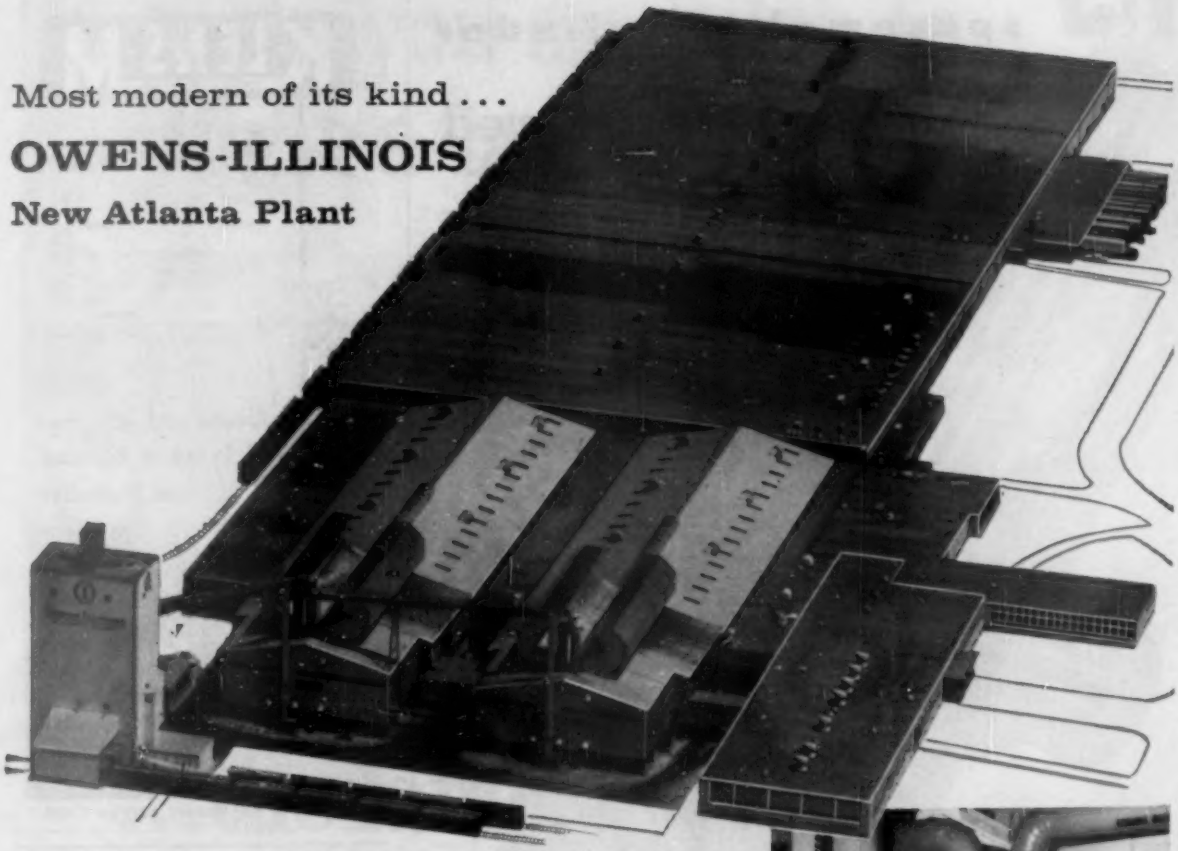
OWENS-ILLINOIS

New Atlanta Plant



Architects and Engineers: Robert and Company Associates, Atlanta, Ga.

General Contractor: George A. Fuller Company, Altanta, Ga.

Mechanical Contractor: Standard Engineering Company of Washington, D.C.

JENKINS VALVES control important service lines

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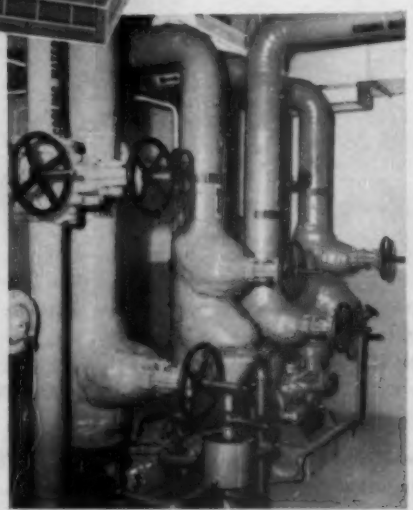
In the glass manufacturing operations trouble-free service piping lines are an essential. Cooling operations require a flow of recirculated water equal to 2-million gallons per day. The furnaces consume about 3-million cubic feet of natural gas per day.

The fact that Jenkins Valves, in large numbers, are used to control water, gas, steam, compressed air and air conditioning lines in this new plant will not surprise most experienced architects, engineers and contractors. For nearly a century, "JENKINS" has been a common specification to assure maximum reliability.

It will pay you to have this important assurance when you specify or install valves . . . especially since Jenkins Valves cost no more. Jenkins Bros., 100 Park Avenue, New York 17.

Sold Through Leading Distributors Everywhere



Some of the many Jenkins Bronze and Iron Valves which control the complex service piping system in the Owens-Illinois plant.

JENKINS

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VALVES

JENKINS SINCE 1864

T-J spacemaker cylinder

Quality Engineered

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with Extras . . .
at No Extra Cost!

You get more—much more—when you specify and use any of T-J's complete line of Spacemaker cylinders. The Spacemaker is engineered to give you better, more accurate, and longer service—offers, exclusively, many extras . . . that are STANDARD, AT NO EXTRA COST!

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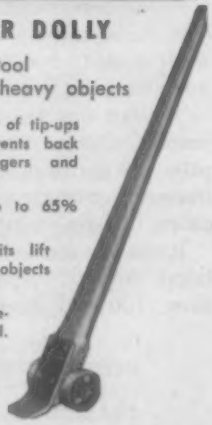
a low cost safe tool to move heavy objects



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Cuts moving time up to 65% on large bulky items.

Correct design permits lift blade to pry under objects flat to the floor.

High leverage ratio between power and load.

Four sizes. Metal or rubber wheels. See local distributor or write to—

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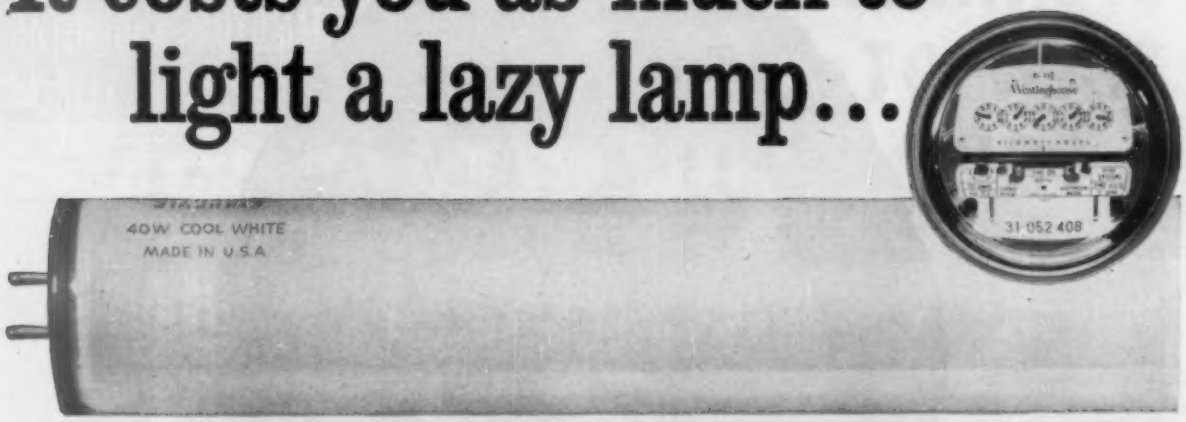
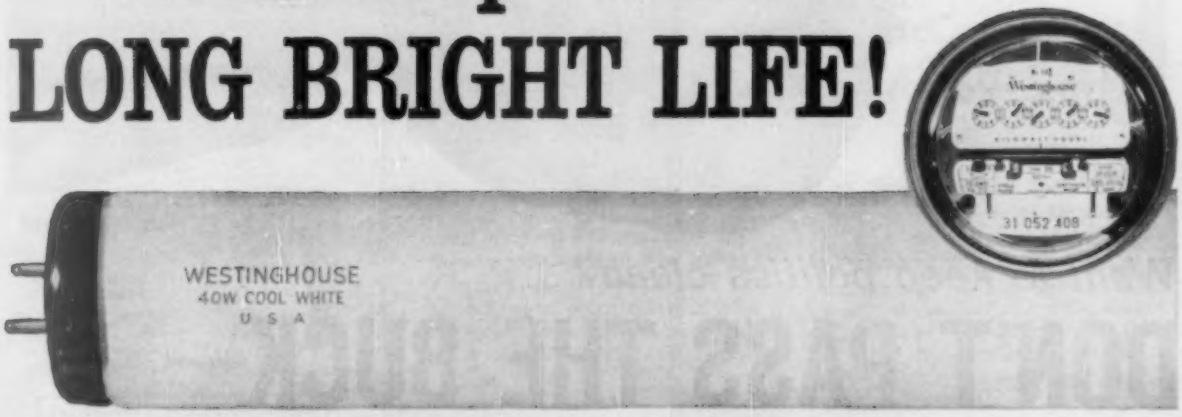
Circle 641 on Reader Service Card

It costs you as much to light a lazy lamp...



as a Westinghouse with "Ultralume" phosphors ...the lamp with the LONG BRIGHT LIFE!



SOME FLUORESCENT LAMPS get "lazy" fast. They eat up the same amount of electricity, but grow dimmer fast. Only Westinghouse fluorescents stay bright as new . . . longer, because Westinghouse lamps have "Ultralume"™ phosphors!

"ULTRALUME" is an exclusive new Westinghouse phosphor that assures maximum brightness for the life of the lamp! "Ultralume" phosphors give you more light per foot of lamp, yet a Westinghouse costs no more to operate than any ordinary lamp.

ALL Westinghouse fluorescents have "Ultralume" phosphors . . . there's one for every business or home use. Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, New Jersey.

Westinghouse (W) FLUORESCENT LAMPS

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DON'T PASS THE BUCK— GIVE A BUCK *to the party of your choice!*

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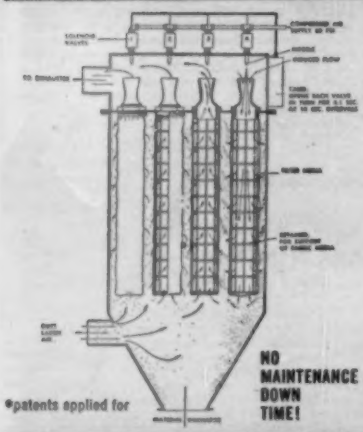
Register
Inform yourself
Vote!

When your authorized party representative knocks at your door... GIVE a dollar... or more!

JET-ACTION does the job!

CONTINUOUS, AUTOMATIC SELF-CLEANING!



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For additional product information and location of the MIKRO-MAN nearest you, see Chemical Engineering Catalog for 1958, pgs. 1467 to 1474.

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WHY PAY MACHINISTS TOP WAGES TO WAIT AT A TOOL CRIB?

Stop costly waiting... use new McCaskey Tool Control System!

NOW! Completely eliminate time lost by highly-paid machine operators drawing and returning tools. New procedures in McCaskey's famous Tool Crib System allow crib attendants to prepare kits of tools for jobs in advance. Machine operators simply pick them up, or they may be delivered.

No Time Wasted At Tool Crib. More Working Time At Machines

Hundreds of plants report that the McCaskey System also reduces tool purchases by cutting crib inventories; reduces loss and theft; cuts costs so many ways it pays for itself in 90 days. *Send for complete details today!*

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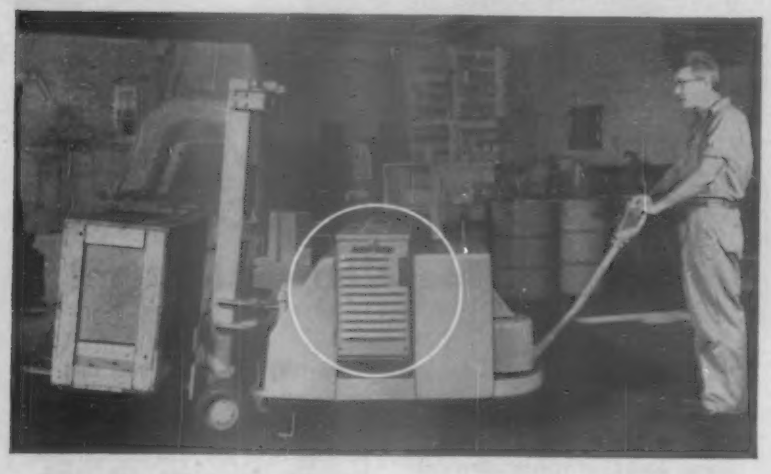
The Most Versatile Power Unit Ever Developed For Small Trucks

READY-POWER BANTAM MODEL W



Only the compact new Bantam Model W provides smooth, dependable gas-electric power that can be quickly interchanged from truck to truck.

A new high-performance unit features 12-volt automotive-type starting and ignition system plus complete choice of idling speed. Full access to engine and generator simplifies adjustment, even on the truck. Fits practically all makes of walkie and rider trucks up to 2000 lbs. *Write today for full information.*

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Modern Tool of Industry

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°FX9700 with adjustable nose pads

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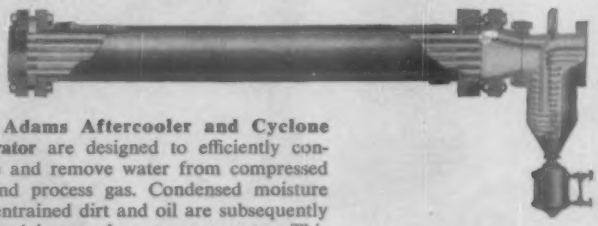
QUALITY PRODUCTS FOR 75 YEARS

Aftercooler and Cyclone Separator designed for cleaner, dryer compressed air

R. P. ADAMS CO., INC.
215 East Park Drive, Buffalo 17, New York



The Adams Aftercooler and Cyclone Separator are designed to efficiently condense and remove water from compressed air and process gas. Condensed moisture and entrained dirt and oil are subsequently removed in a cyclone type separator. This unit is scientifically designed for maximum removal efficiency over a wide range of flow rates.

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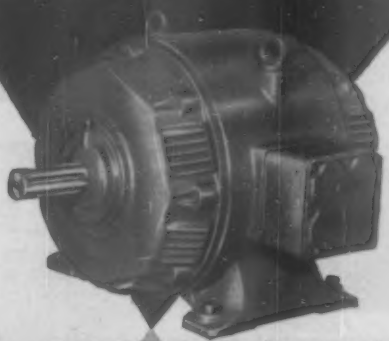
This wide range of sizes enables the economical utilization of Adams Aftercoolers and Separators in virtually all industrial application. For further information on how R. P. Adams' units will solve your compressed air problems and save you money, write today for Bulletin 711.

For more facts circle 648 on Reader Service Card

A 125 H.P. Brook A.C. Motor Is *NOT Almost* 125 H.P.



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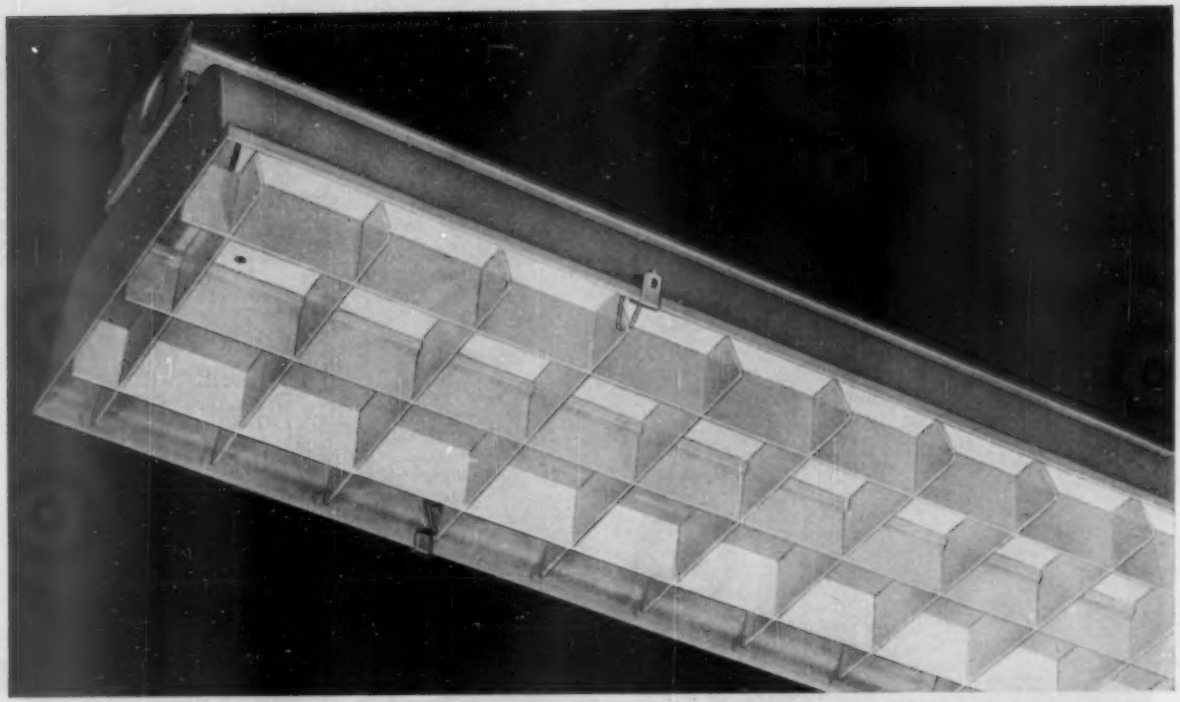

Sylvania VHO Special Series (VHO-2V14-RS). Engineered especially for Sylvania VHO lamps. Rugged 4-foot industrial type has porcelainized reflector . . . 19% upward light component . . . green channel and tinted green louvers with 30° x 30° eye shielding. Also in 8-foot length (VHO-2V28-RS).

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Sylvania now offers 7 different lines of fixtures to handle the revolutionary Sylvania VHO and other very high intensity fluorescent lamps. Not only in industrial plants, but in offices and commercial applications, you can now take full advantage of the higher footcandle levels and far-reaching economies offered by these great advances in lighting.

With Sylvania fixtures, you can choose from 7 different lines—15 fixtures in all—that use very high output lamps. Each style has its own features, advantages and applications.

The higher-level illumination provided makes Sylvania very high output fixtures ideal for high-mounting installation, for low-mounting where higher intensities are called for, or applications where simplification of lighting layout is desired. For a no-obligation demonstration, call in your Sylvania Fixture Specialist. Or write direct to Lighting Headquarters for informative folder V-800.

SYLVANIA ELECTRIC PRODUCTS INC.
Department K-1
Lighting Division—Fixtures
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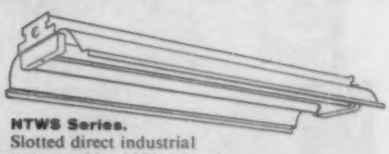
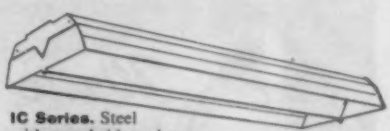
Diamond-"I" Series. For high quality industrial illumination where specs call for 25% upward light component. Has high overall illumination efficiency of 85%, porcelainized reflector, 30° crosswise shielding. Takes all T-12 very high output lamps. Louvers optional. In 4- or 8-foot lengths.



NTWS Series. Slotted direct industrial type provides 14% upward light. Choice of enamel or porcelain reflector. Takes all types of very high output lamps. Louvers optional. In 4- or 8-foot lengths.



IC Series. Steel with metal sides, gives semi-direct lighting distribution with 30% upward light. Especially suited for high-mounting where maintenance is a problem—also office areas. Takes all very high output lamps. Louvers available. In 4- or 8-foot lengths.

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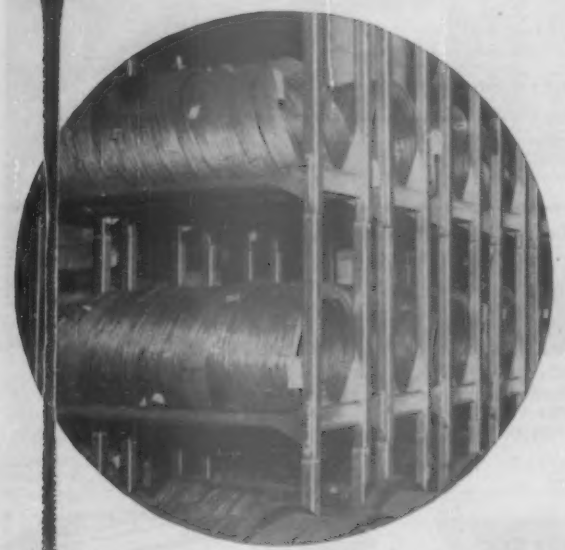

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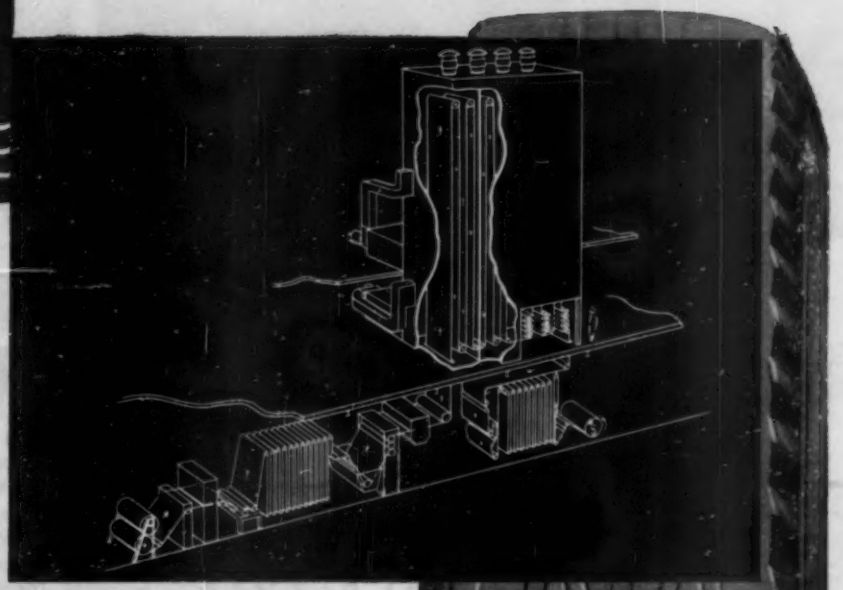

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* John Waldron Corporation, an affiliate of J. O. Ross Engineering, has devoted practically all of its business life of 132 years to the engineering, design, and manufacture of web-processing machinery. Ross and Waldron engineers work together on many projects of which this Tire Processing Unit is an excellent specific example.

M-R

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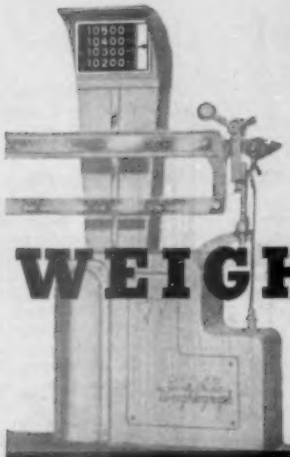

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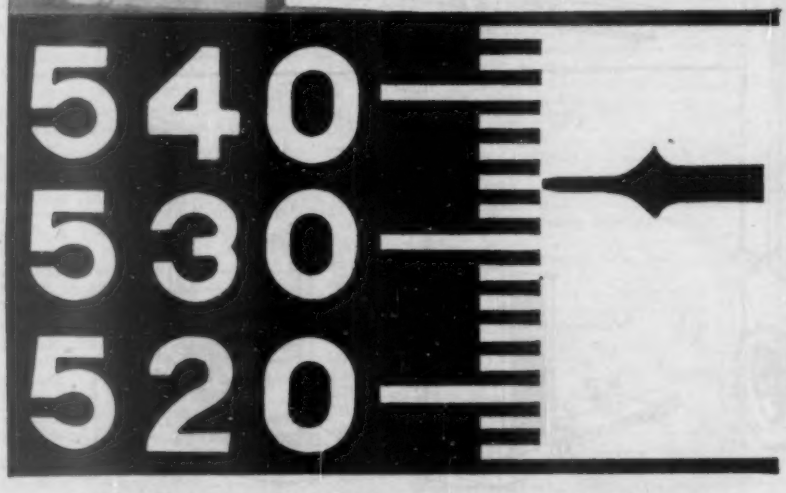

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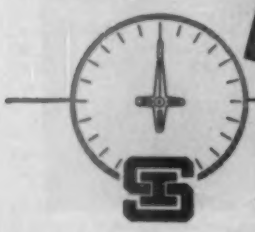

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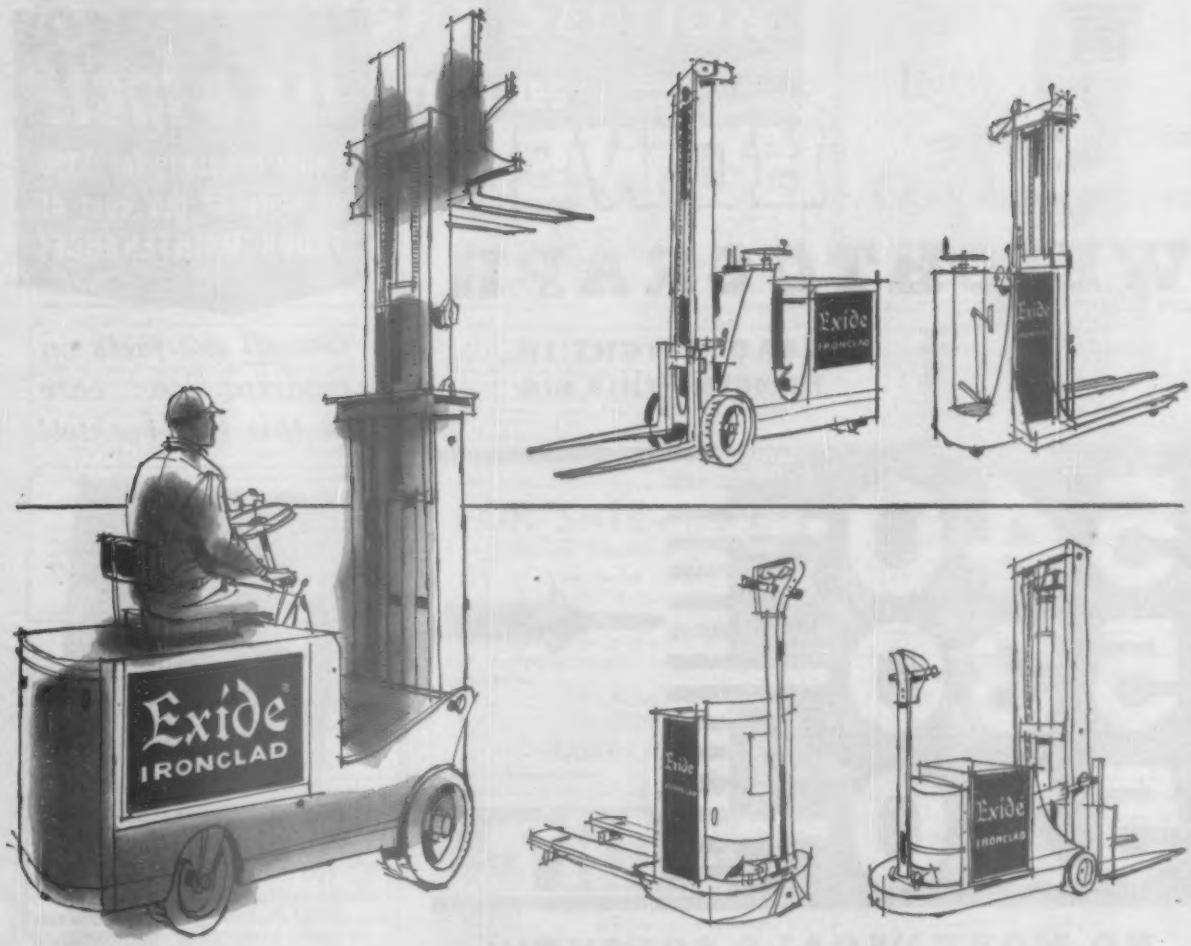

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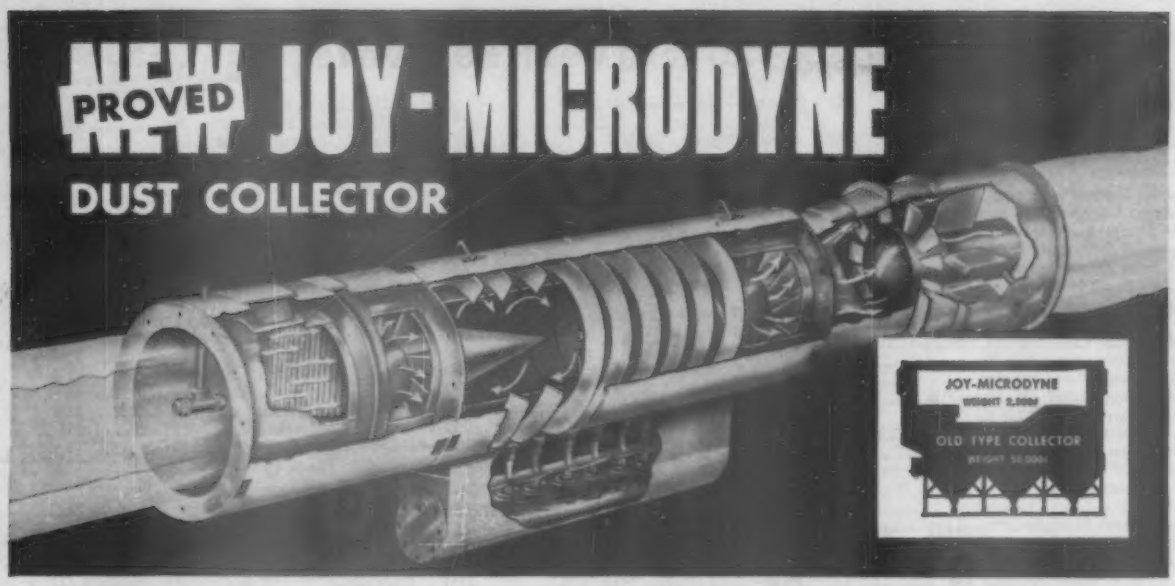
NEW PROVED JOY-MICRODYNE DUST COLLECTOR



Profile of a Problem Solver

Here is an in-duct "educated pipe" that laughs at space, weight and water limitations as it collects over 99% of dust 5 microns and larger; 92% of 2-micron dust, and substantial amounts of smaller dust.

Particles enter through water-saturated air, slam against a water-film-covered impingement element, encase themselves in water droplets as they pass through, then whirl and collect on the sides of the middle section, to finally drain into a sump. Cleaned air is straightened and thrust on its way by an integral Joy Axivane Fan.

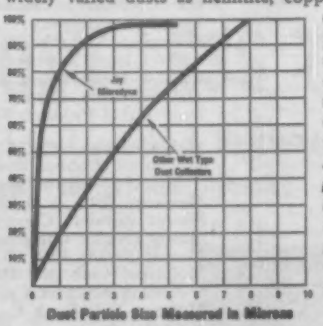
This 48,000 cfm installation shows compact assembly and space economy of in-duct placement.

SAVES SPACE—Installs as an integral section of ductwork; requires only 1/10 to 1/20 the space of conventional units. 2500 cfm unit is 10 feet long; 1.5 feet in diameter.

SAVES WEIGHT—Even the largest unit—64,000 cfm, 5 feet in diameter, 32 feet long—weighs only 6,500 pounds . . . or 1/5 the weight of conventional collectors. 2,500 cfm unit weighs only 325 pounds.

SAVES WATER—The largest Joy collector requires only 48 GPM flow—much less than comparable wet collectors. Add a Delpark Filter (Sold by Joy) and water can be recirculated to recover valuable dusts. The filter also reduces water borne solids to give a dependable, clear water supply from a dirty water source.

SUCCESSFUL INSTALLATIONS—Joy collectors from 500 cfm through 64,000 cfm are *now in use* collecting such widely varied dusts as hemitite, copper and uranium ores, coal, quartz, limestone, phosphate, stainless steel and titanium carbide grindings. For answer to your dust collecting problems, write, wire or call: ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** *In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



Performance graph of actual installation shows efficiency of the Joy-Microdyne Dust Collector. (A micron is 1/25,000 inch)

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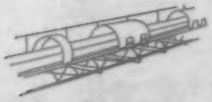

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49—Eccentric Geared Presses
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72—Electronic Computer
73—Label Addressing Systems
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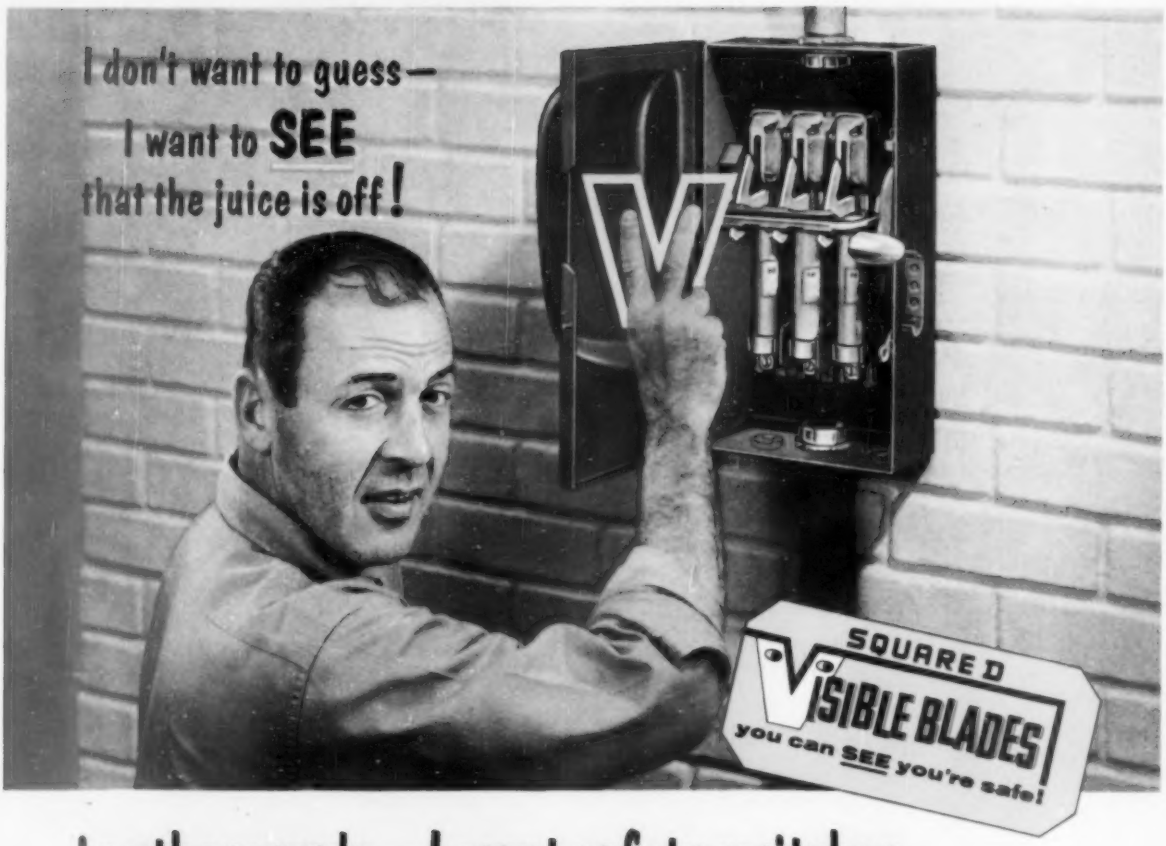

...in other words—I want safety switches with VISIBLE BLADES!

The men who pull the switches will tell you what can happen when a switch, *believed* to be open—*isn't.* A lot of things can happen—and every one of them is bad. Personnel is in danger. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of these possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages?

100,000-ampere SHORT CIRCUIT Capacity —*Another Plus Feature*

Square D safety switches equipped with high capacity current limiting fuses provide full protection on even the highest electrical loads. Independent tests by a high capacity laboratory on Square D safety switches — rated at 30 through 600 amperes—subjected the switches to both open and closed tests on 100,000 ampere short-circuited systems. *Not one Square D switch showed any sign of failure!* Further proof that Square D switches provide *plus* safety. They cost no more—why settle for less?

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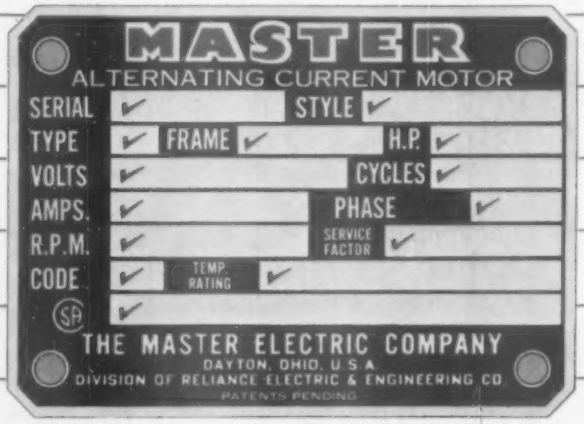

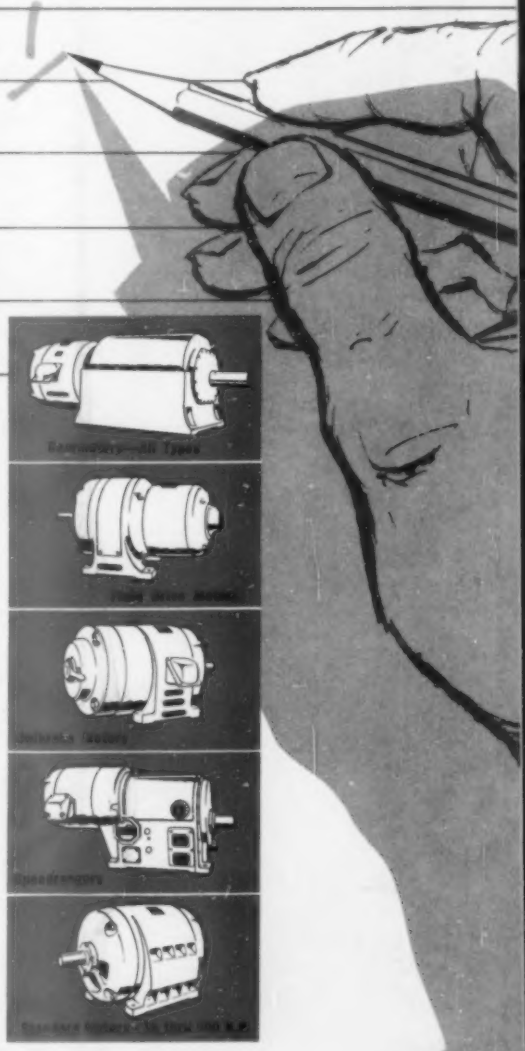

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1/8 THRU 400 H.P.

Your drive requirements are peculiarly your own—and you want ultimum performance, not compromise. So it's only good sense to talk over *all* drive requirements here at Master, where you can literally write your own ticket while choosing from the widest selection in the nation.

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Three more things you can figure on! All the engineering help you want — quality control as *you'd* want it — honest deliveries. When can we get together?

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Construction....Open, enclosed, explosion-proof, fan-cooled, splash-proof, special purpose.

Speeds.....Single speed, multi-speed, and variable speed.

Installation....Horizontal or vertical with or without flanges and other features.

Power Drive Features.....Electric brakes (2 types)—5 types of gear reduction up to 432 to 1 ratio. Mechanically and electronically controlled variable speed units — fluid drives — every type of mounting.

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